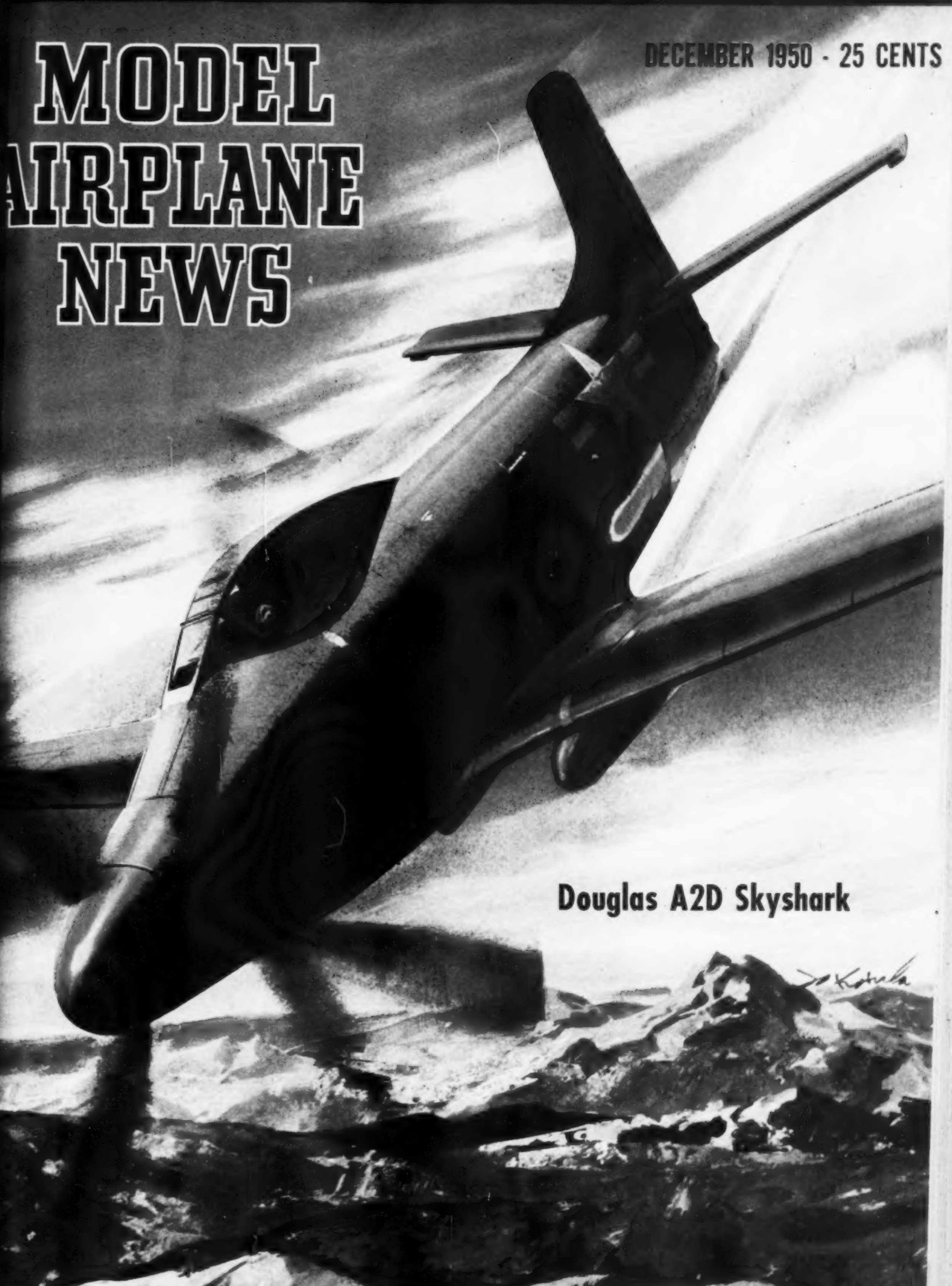
NATIONALS OPEN RUBBER WINNER

MODEL AIRPLANE NEWS

DECEMBER 1950 · 25 CENTS



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MODEL AIRPLANE NEWS

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DECEMBER 1950 VOL. XLIII—NO. 6

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SCRAP BOX

By BILL WINTER

THE great question of whether the Academy of Model Aeronautics is doing a job for the modeler, and whether or not something could be done about national headquarters, no longer can be avoided. California, in the process of organizing a model association which may include the whole western United States, threatens seccession. Midwestern spokesmen long have been bitter. "If the NAA-AMA does not put the academy on a sound basis with more efficient operation and capable administration, there is little point in our being affiliated with them," states Russell D. Johnson, secretary of the *Thermal Thumbers*, of Los Angeles.

The AMA question is an old one; the fact that it is old and still unsettled indicates how difficult it is to solve. And, like any old standing issue, there are hot proponents for both the defense of the status quo and the demolition of all that has been built up. Either way, the Academy is headed for disaster, except that, as it stands at present, the struggle may be prolonged. Unfortunately, it remains for both sides to prove their point. If, so far, the weight of evidence lies with the critics, too many of the answers are missing to permit reaching conclusions. Let's, first, consider the charges as made by the *Thermal Thumbers*—charges made not to tear the AMA apart, but as constructive criticism to help the Academy do the job it was designed to do.

First is communication. Business letters that are either not answered or answered tardily. Second is organization. Modelers elect a president, but his hands are tied with red tape and his efforts are slowed by poor communication. Third is finances. AMA should operate independently of the NAA financially; annual statements audited by recognized auditors should be sent to all members. Fourth is the Wakefield program. Fifth is publication of new rules, to be sent every member by January 1st, along with existing records, Nationals info, data on the Wakefield program. Miscellaneous criticisms include the facts that the executive director is appointed by NAA, and the conspicuous delay on adoption of the proposed new constitution openly discussed between leader members and NAA representatives at the last Olathe Nationals.

Considering communication, the fact that it is bad simply cannot be challenged. However, this writer has observed, during visits to headquarters, piles of dictaphone rolls awaiting transcription. It is evident that either we do not employ sufficient stenographic help or that we do not pay enough for efficient help—or, of course, that the parent organization makes too many demands on the AMA staff. Do we have adequate help? Would we have funds for more or better help? What are the facts?

Organization? Clearly, the Director should be an AMA man. It has long been our feeling that the Director is squarely in the middle if he must owe his existence to the NAA. That his hands frequently must be tied trying to observe the best interests of both the organization which appoints him, and the group that makes the whole thing possible in the first place, is a condition we cannot tolerate. Let's untie the Director's hands before we judge him, and so he can speak freely.

Finances? It is common knowledge that the NAA has been in a bad way for some years and that the AMA itself has been comparatively healthy. Why shouldn't the two operate separately, distinctly so, in financial matters? It should be noted that the NAA stresses the fact they have at times underwritten AMA deficits, and that important sanction fees are the principal reason why we are well in the black. On the one hand, there has been Frank Bushey's statement on finances, which should have ended the gossip, but on the other, ex-officials like Mike Thomas, recent treasurer, and C. O. Wright, militant two-time president, state they never could discover the score. Pointed questions are still being asked and, it is imperative that satisfactory answers be given. Why cannot this matter be cleared up? Let the director present satisfactory answers at an Executive Council meeting at the next Nationals, or even sooner in the columns of MODEL AVIATION.

Publication of new rules, etc.? It is a fact that rules' booklets have been published for us by wealthy concerns who want no credit. Are we able to print and distribute rules, etc., to all members? The reliable publication of MODEL AVIATION should answer the rules and information problem. Unless records and other allied matters can be included in MODEL AVIATION, we do not believe that funds and efforts should be spread too thin.

What can be done? It would seem that the proposed Constitution was inspired by the very conditions now highlighted by the coast ultimatum. That Constitution is a conservative document that involves no radical changes, but it does leave the way open for democratic action when and if the future demands it. The West Coast is not familiar with the proposed Constitution, a fact difficult to believe, if only because it shows lack of unity between sections. With things as they stand, no amount of talk, with the best intentions, is going to accomplish any of the objectives under discussion.

Opposition to the new constitution is based on the premise that the members should decide if they are capable of taking over the running of the Academy. Actually, it includes no proposal to break away completely from NAA, although the year-in and year-out stalemate we now have will eventually produce a far more destructive break. No one in their right mind is thinking of complete change. It is indeed interesting that a proposed constitution that would accomplish necessary improvements, has been adroitly lost in a never-never land.

With regard to the Director, it would be wrong to place him at the mercy of pressure groups. No high-caliber man would keep, or seek, such a position if the position did not offer reasonable security. Should the Director not be an NAA appointeee, he should be insured a reasonable term and, after that, renewal of term would depend on the record.

It would be a great harm and an actual disservice to modelers everywhere for the Coast or any other splinter group to break away from the Academy. If other sections did likewise, as the Midwest well might do, it would be hard to see how the Academy could continue. The regulations and rules, contests, the whole activity would be a disorganized mess with opportunists

(*Turn to page 40*)

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FLASH

NEWS OF AVIATION

AIR FORCE and Naval Aviation have ordered more than 7500 new aircraft, or three times as many as their original program called for in the new fiscal year which began last July 1st. Almost all of these new planes are the familiar types already in production and the services have simply called for additional quantities plus an accelerated delivery schedule. These include the Boeing B-47 and B-50 medium bombers, the Convair B-36 heavy bomber, North American F-86, Republic F-84, Grumman F9F and McDonnell F2H jet fighters; Northrop F-89 and Lockheed F-94 all-weather fighters; Boeing C-97, Douglas C-124, Fairchild C-119 cargo planes and a variety of helicopter types. New types to go into production are the Douglas A2D-1 *Skyshark* turboprop-powered attack plane, the Vought F7U *Cutlass* tailless Navy fighter, and the Douglas F3D *Skyknight* all-weather fighter. (These latter two are already in limited production on a service test basis.) Still to be announced are production orders for two recent competitions: the penetration fighter, contested by the McDonnell XF-88, Lockheed XF-90 and Republic F-84F sweptwing designs; and the assault transport, contested by the Northrop C-125, Chase C-123 and a modified Fairchild C-82 design.

EXCLUSIVE INTERVIEWS by your *Flash* reporter with Pentagon officials and officers revealed the official position that the war in Korea had nothing to do with this expansion of our air forces, that it was due anyway and that the end of Korean hostilities will have absolutely no effect on the program. This lowering of the barriers on aircraft procurement may have coincided with two recent personnel changes: the removal of economy-minded Louis Johnson as Secretary of Defense and the appointment of Thomas K. Finletter as Secretary of Air Force. It is significant that the original fiscal 1951 procurement program called for only a 58-group Air Force and that the current program is building towards a 69-group Air Force, with a 90-group Air Force already in the planning stage. This means that the lean postwar years for Air Power are now gone and the United States is once again on the road toward absolute leadership in the air.

THESE SAME interviews brought forth a long-sought answer to the question: "What happened to Air Power in Korea?" Certainly the early days of the fighting in Korea seemed to indict our Air Force and Naval Aviation in their ground support activities since they absolutely failed to even blunt the Red Korean attack. Air Force officers and executives state bluntly that not only is our modern Air Force not geared to fight a Korean-type action but there are no plans to make it so! While this sounds like a dangerous policy at first reading, these officials explain that the primary mission of the Air Force is to fight an all-out atomic war with Russia in the future and that is the organizational structure and the equipment being assembled. Secretary Finletter sincerely believes that a striking force of atom bomb-laden B-36 bombers in readiness at all times will do more to deter Russia than any other combination of political or military strength. If this means that Air Force power to stop a Korean "brush fire" action is inadequate, then it is simply unavoidable. Better to fumble a Korean-type brawl than to fumble an atomic blitz of the future, a high-ranking officer says. And I think we kind of agree with him!

WORLD'S MOST powerful turboprop engine is no longer a British design but the new T34 recently announced by our own Pratt & Whitney Aircraft Division of United Aircraft Corp. It is currently rated at 6,000 hp and has passed a 50-hour test stand run at 5700 hp. Navy believes that continuing improvements on the engine will raise its power to at least 8,000 horsepower! Most astonishing feature of the new engine, aside from its great power, is its low specific fuel consumption of .62 lb. of fuel per horsepower per hour. In more understandable terms, this means that the current engine consumes 550 gallons of kerosene per hour. By comparison, two Pratt & Whitney R-4360 *Wasp Major* engines, which it would take to produce the same amount of power, would consume 500 gallons of high-octane gasoline. This shows how astonishingly close to conventional reciprocating engines the new turboprop is approaching in fuel economy. In other ways the turboprop has already passed the piston engine. For example, the new T34 weighs only 2550 lb., against the 3500 lb. of the *Wasp Major* and this means that the airplane can carry the T34 plus 140 gallons of kerosene for the same weight as the piston engine of only about one-half as much power. This extra fuel is virtually free of charge so that the total *weight* of engine plus fuel for the turboprop is less than that of the piston engine. In dollars and cents, which is the only sound way of studying the two engines, that 550 gallons of kerosene per hour costs only about $36.00, whereas the 500 gallons of aviation gasoline for the piston

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REPORT FROM THE WEST

by Jim Saftig

THE Los Angeles Jr. Chamber of Commerce again sponsored the Fifth Annual All-Western Model Aircraft Meet the last of September. This contest was held at three different locations. The control line events took place at the Hollywood Park Race Track in Inglewood. Indoor events were run off at the National Guard Armory in Exposition Park, Los Angeles, and the free-flight events took place at the Los Angeles International Airport, Inglewood. Control line speed had all classes combined and was run off on a handicap basis. All classes were combined in the acrobatic class also. In the indoor rubber power events, stick and cabin were combined. For outdoor rubber also, stick and cabin were combined, as was gas free-flight. The presentation of awards took place at the conclusion of the outdoor events and was made by Fred C. Walker, Vice-President of the *Los Angeles Jr. Chamber of Commerce*. The first, second, and third place winners received very handsome trophies, and the sweepstakes winners were given beautiful plaques. Many western model concerns contributed financially and materially to the staging of this meet. The control line events were handled by Keith Storey of Pasadena, who holds four world speed records for model aircraft and who is one of the top men in speed and team speed events. Andy Peterson of Burbank directed the indoor events, and Bob Holland, 1948 National Champ, directed the outdoor events.

Results:

Control Line Speed Open—Jim McElroy, 149.87; *Sr.*—R. Tracy, 149.87; *Jr.*—Steve Jenteges, 140.07. *Stunt Open*—Bob Palmer; *Sr.*—Doug Bell; *Jr.*—D. Miller. *F.F. Gas Open*—Jack Oxley; *Sr.*—Tom Moffitt; *Jr.*—Art Gillet. *Towline Glider Open*—Ernie Wrisley; *Sr.*—James Decker; *Jr.*—Pete Davey. *Hand Launch Glider Outdoor Open*—Bob Degan; *Sr.*—Tom Moffitt; *Jr.*—J. Isaccson. *Hand Launch Glider Indoor Open*—Bill Tharp; *Sr.*—Don Hellfelder; *Jr.*—Bruce Strehlow. *Rubber Open*—Manuel Andrade; *Sr.*—Don Hollfelder; *Jr.*—Don Sawyer. *Sweepstakes Open*—Carl Rambo; *Sr.*—Tom Moffitt; *Jr.*—J. Isaccson.

Bud Barburst checks over his Cumulus while Carl Goldberg and F. L. Swaney look on

We had another of our very interesting chats with Bill Butler, ham operator and radio control flyer, about some of the "tube and transmitter" lads. As you all know, Bill, Colby Evett, and Jim "Man from Mars" Walker represented the West in the Radio Control event at the Nats. Butler was telling us about Ed Rockwood's new Tone Control outfit that has multi-channels from one carrier. With this slick new outfit, Doc Poco and many others are doing elevator loops straightforward, which are definitely a bit rough to execute. We have learned further that anything developed by Rockwood is a definite "must" for the radio boys. If any of you lads are interested in this outfit, you can find out more about it by getting in touch with Ed at Walnut Creek, California. Howard Bonner, another of the top radio men, has been developing some new escapements that are very reliable and are definitely light on the current. Howard, we understand, is quite a tool designer and is majoring in design work at U.C.L.A. Another of the enthusiasts using his own equipment is Ted Cushman. Ted has been doing some mighty sharp work with his modified *Rudder Bug*. Bill Butler is working with the very popular *Aero-Trol* set along with his *Beacon* and *Rockwood* outfits. It looks from here as if radio control may have a fighting chance in the near future, as things are rapidly coming to a head. It is hoped that F.C.C. will lower the barriers a bit more to give the radio newcomers the needed boost to get them out in the circles. We should like to thank F.C.C. for the cooperation it has given the Academy thus far.

Lud Kading proudly displays his "fun models" (K & B power, of course!)

Let's give Fred Blanchard a well deserved plug for the swell work that he has been doing with the *Hollywood Boys Club*, model section. Fred is in charge of a group of approximately 35 boys ranging from 7 to 17 years of age. These youngsters attend club meetings every day and receive excellent training pertaining to model building and flying. When meets are held, you can always find Fred and his boys out on the field with a fleet of very super ships. This club is sponsored by the *Hollywood Exchange Club*.

Keith Storey recently introduced us to Ken Willard—Ken hails from St. Louis and is now making his home in Pasadena. He has written many excellent articles for model magazines, which some of you have no doubt read. He is the designer of the *Santa Anita 3 yr. old*, a sport F.F. job for .035 to .049 engines and a *S.A. 2 yr. old* for

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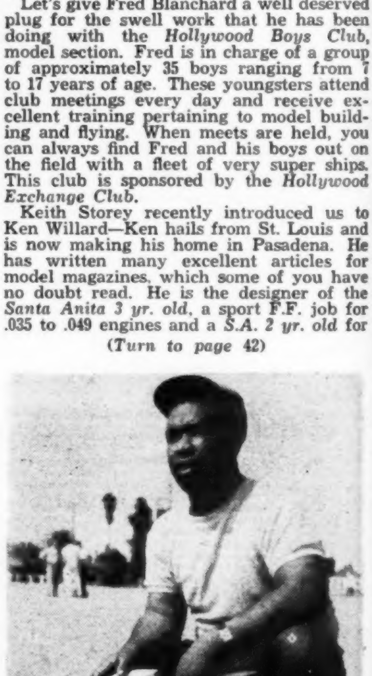

Jim McElroy lifts the hood on his winning McCoy 60—powered speedster

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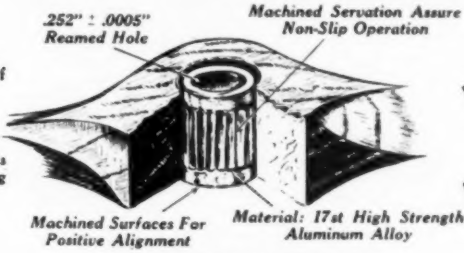

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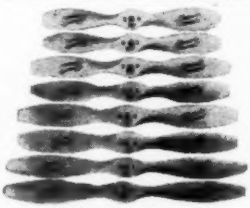

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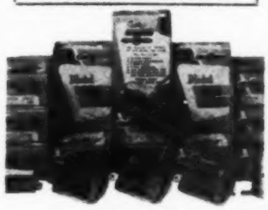

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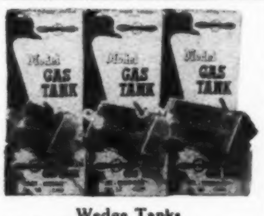

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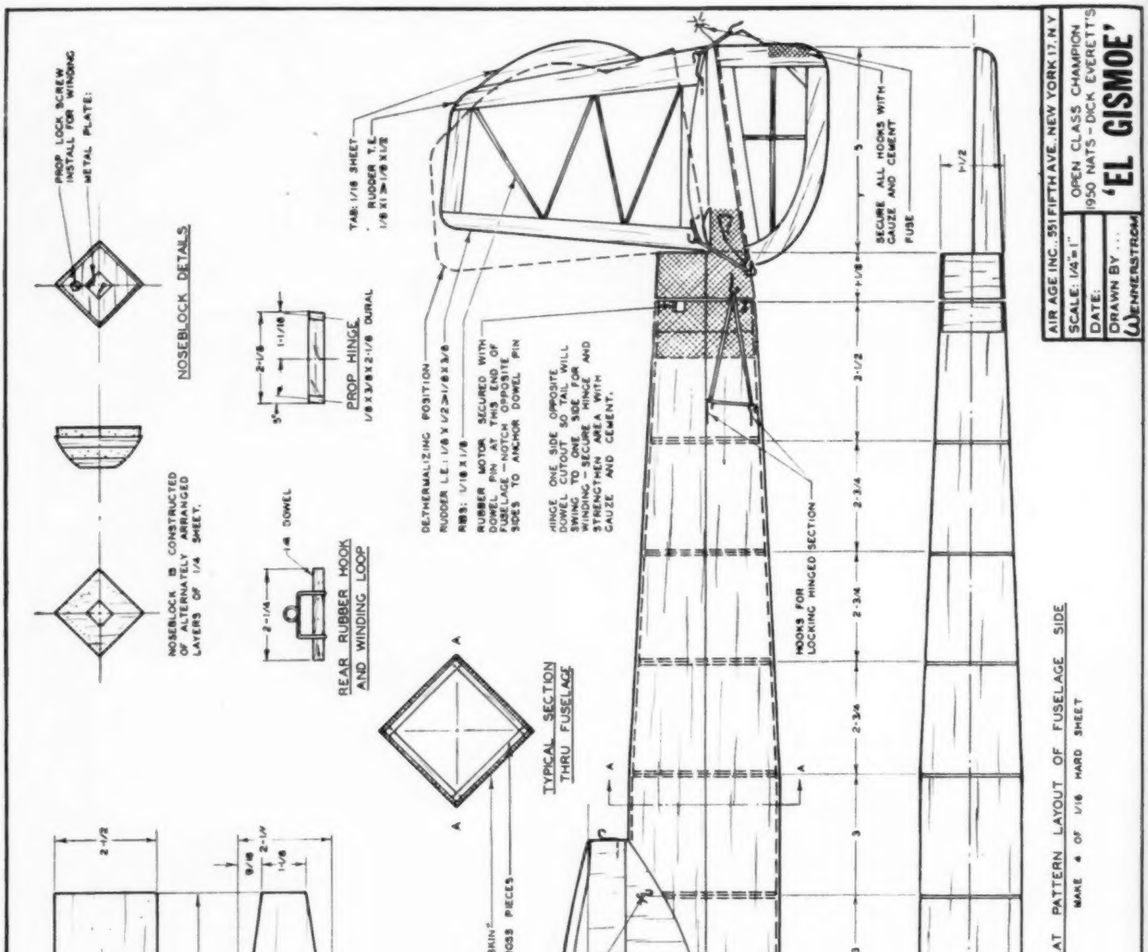

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1/4 DOWEL
TYPICAL SECTION THRU FUSELAGE
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1/16 X 1/8 CROSS PIECES
PROP BLANK LAYOUT
TAB: 1/16 SHEET
RUDDER T.E. 1/8 X 1 >1/8 X 1/2
DETHERMALIZING POSITION
RUDDER L.E.: 1/8 X 1/2 >1/8 X 3/8
RIBS: 1/16 X 1/8
RUBBER MOTOR SECURED WITH DOWEL PIN AT THIS END OF FUSELAGE - NOTCH OPPOSITE SIDES TO ANCHOR DOWEL PIN
HINGE ONE SIDE OPPOSITE DOWEL CUTOUT SO TAIL WILL SWING TO ONE SIDE FOR WINDING - SECURE HINGE AND STRENGTHEN AREA WITH GAUZE AND CEMENT.
HOOKS FOR LOCKING HINGED SECTION
SECURE ALL HOOKS WITH GAUZE AND CEMENT
FUSE
TWO HOOKS EACH SIDE SECURE SADDLE TO FUSELAGE WITH RUBBER BANDS
WING PLATFORM
3/16 INCIDENCE
WING TO PYLON TIEDOWN
SECURE HINGE WITH GAUZE AND CEMENT
HINGE PINS: SECURE TO PROP BLADES
HINGE PLATE: LOOP EACH END
FLAT PATTERN LAYOUT OF FUSELAGE SIDE
MAKE 4 OF 1/16 HARD SHEET
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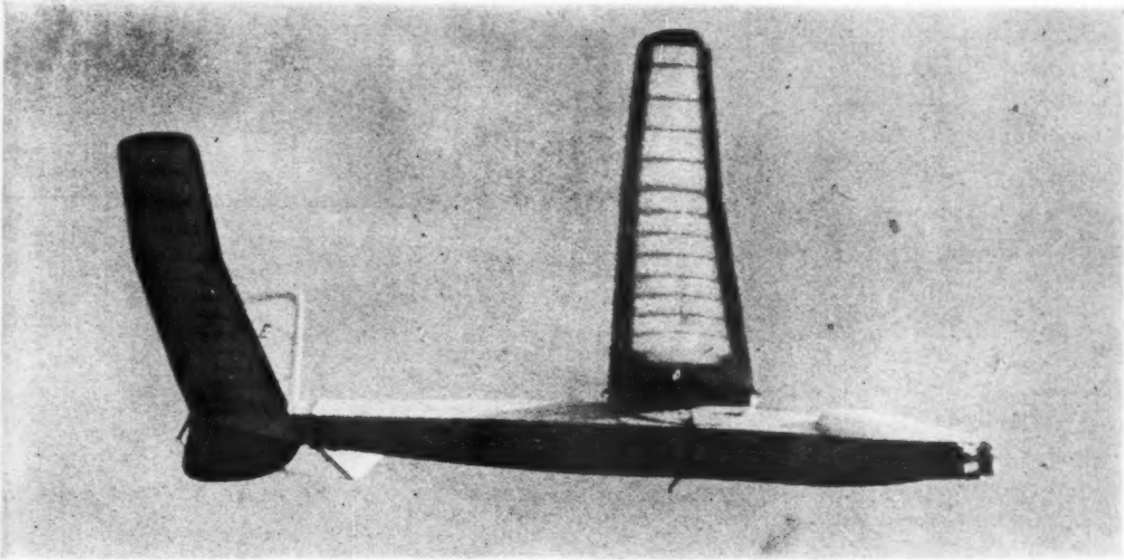
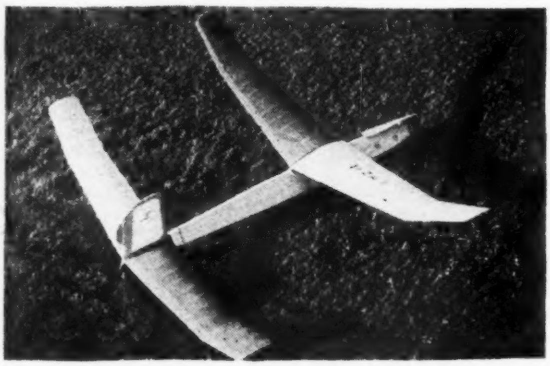
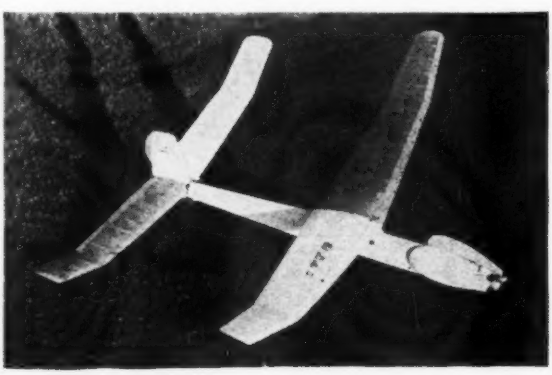


el gizmoe

by DICK EVERETT



This model confounded the critics to win its class at Dallas last summer



THE winning of the stick contest by *El Gizmoe* at the 1950 Nats in Dallas was the result of a long victory-starved, struggle to take this event. At the 1941 Nats in Chicago, an earlier *Gizmoe* placed second, only three seconds out of first place; at the 1949 Nationals in Olathe, another ship placed second. This year with 2nd places getting a little monotonous, we were ready to toss in the proverbial towel when it was rumored that another fellow had higher time than we did. But after chasing down the rumor, it was found that *El Gizmoe* had finally won! The winning flights were very good and included two dethermalized flights of over seven minutes, out of sight of the timers.

The ship is a little on the unorthodox side to put it mildly and a lot of questions may be asked as to just how such a design originated. It can be said that it was no accident. Several gas models had been built which had very large tails, some as much as 65% and the glide had been a joy to behold. When time came to construct this stick model, it was decided to go a little overboard and try a very large one so the 80% tail was built. The results speak well for themselves; those who saw the ship gliding at the Nationals were truly amazed how well it floated. The next ship will have a 80% *wing*—who knows, it may never come down!

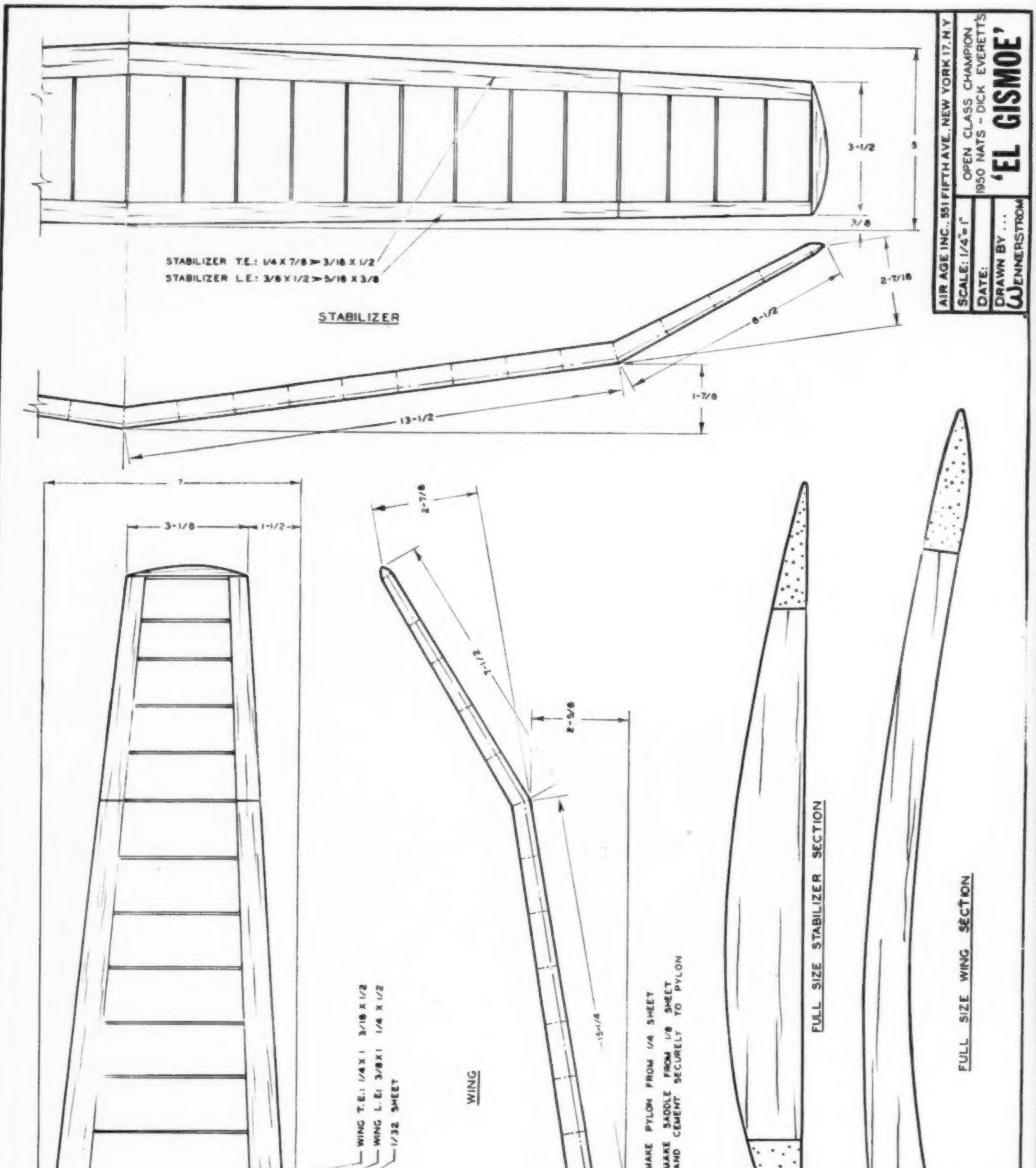
The airfoils picked for the dual job are both old tried and true model designs. The very familar McBride B-7 for the horizontal tail was modified to the extent of using a flat bottom and inclining the chord line at 3% to provide the necessary thickness for the leading edge. The Marquardt S-2 used for the wing was designed by oldtimer Roy Marquardt and also uses the B-7 for the upper camber, with the bottom curvature set up by Roy to provide good camber thruout the full span of a well-tapered wing. These sections adapt themselves very easily for tapered construction, for one has to only cut from the trailing edge for the necessary reduced rib length. The sparless construction is plenty strong for ordinary flying, but for windy weather flying it is recommended that a "strut" of heavy thread be used at the leading edge, extending from the poly-breaks around the fuselage.

The sheet balsa fuselage is slightly heavier than the conventional type, but it is exceptionally strong, and if you ever break a motor in it, you will still be able to fly since there will still be enough strength left to take the torque of the wound motor. The folding rear section of the fuselage is for winding only. You will find it much easier to wind when you don't have that big prop to turn, along with the rubber.

The pop-up tail type of dethermalizer was chosen for its simplicity and efficiency. Common butcher's cord was used for a fuse, 1" of it burning for about 1 min. The vertical tail is used for a stop to limit the travel of the pop-up. Notch the fuselage on top for the correct angle.

The prop is the wide bladed variety commonly called a butter paddle. Though small in diameter, it is large in blade area and pitch, in order to get the most out of the power. You will find it will really haul the ship upstairs for that long floating glide.

(*Turn to page 38*)


AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: 1/4"=1"
DATE:
DRAWN BY ... WENNERSTROM
OPEN CLASS CHAMPION
1950 NATS - DICK EVERETT'S
'EL GISMOE'
3-1/2
5
3/8
2-7/16
8-1/2
1-7/8
13-1/2
STABILIZER T.E.: 1/4 X 7/8 > 3/16 X 1/2
STABILIZER L.E.: 3/8 X 1/2 > 5/16 X 3/8
STABILIZER
7
3-1/8
1-1/2
2-7/8
7-1/2
2-5/8
15-1/4
WING T.E.: 1/4 X 1 > 3/16 X 1/2
WING L.E.: 3/8 X 1 > 1/4 X 1/2
1/32 SHEET
WING
MAKE PYLON FROM 1/4 SHEET
MAKE SADDLE FROM 1/8 SHEET AND CEMENT SECURELY TO PYLON
FULL SIZE STABILIZER SECTION
FULL SIZE WING SECTION

by LAWRENCE H. CONOVER

THE 1950 contest season is almost over now. The ships you fly, the way in which they are flown, and how they perform will be discussed when next year's rules are being formulated. There have been many discussions which could lead to drastic changes in the present scene. Do you want these changes? I have an unhappy feeling that most modelers are a little indifferent toward this situation. Before it is too late, take time to look around and see what the present rules are doing, who is flying what, and why. If you wish to continue flying the ships you now have, or if you think there should be some changes made, then let your voice be heard. Write letters to model magazines presenting your views on the kind of flying you want. Discuss rules changes with your club, and send in the results to your AMA district representative. Too often the people who draw up the rules just cannot get to all the builders and contestants to find out exactly what they want.

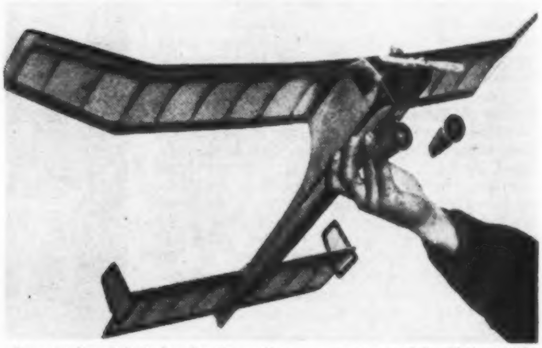
Here are some of my observations and ideas, mostly about free flight.

Should the rules be suited to the contest flier, or the sport (casual) modeler? Contest flying has risen from just a throw-it-together-and-hope deal to an exciting, high-flying, hard-running competition. A consistent winner must now have a variety of skills ranging from amateur meterologist to mechanical genius. Oh! Oh! Right away I see those people who jump up and shout, "We are in the game for just the fun in it. We don't want to have to work that hard on something that is supposed to be a spare-time hobby."

Okay! There is no reason why you can't fly just as you wish, and have a good time too! However, if you cannot afford to invest much time and effort, you should not expect to win first places. There is an exception. You have in your favor that element of luck, the thermal. Too many armchair-enthusiasts look at the wrong end of this deal. They are so busy worrying about lost airplanes and "unfair thermal winners," they overlook a very important fact. The thermal provides that certain something which other phases of the sport do not have. It gives *any* free flight modeler a flying chance to win the top prizes. It gives the beginner, and even the "old clunker," the chance to win out over the hot-rod expert who can afford to put much time and energy into his hobby. This might seem unfair to the hard-working modeler, but actually it only increases his zest for competition flying. The sum of this question is: I feel the rules should favor the hard-working contest flier (there are a lot of them) rather than the casual modeler who may attend only one or two meets in the season, and probably is more or less indifferent toward the advancement of competitive model aviation.

Let us have no slow-down restrictions. The surest way to kill free flight would be to take away that thrill of the fast, high climb and the slow-soaring glide. Suggestions have passed around and movements have started which would limit every efficient flying characteristic of our models. Precision flying belongs in radio control and stunt U-control. (*Turn to page* 55)

Unique pusher design with *Arden* .199 power is launched by Jim Lang

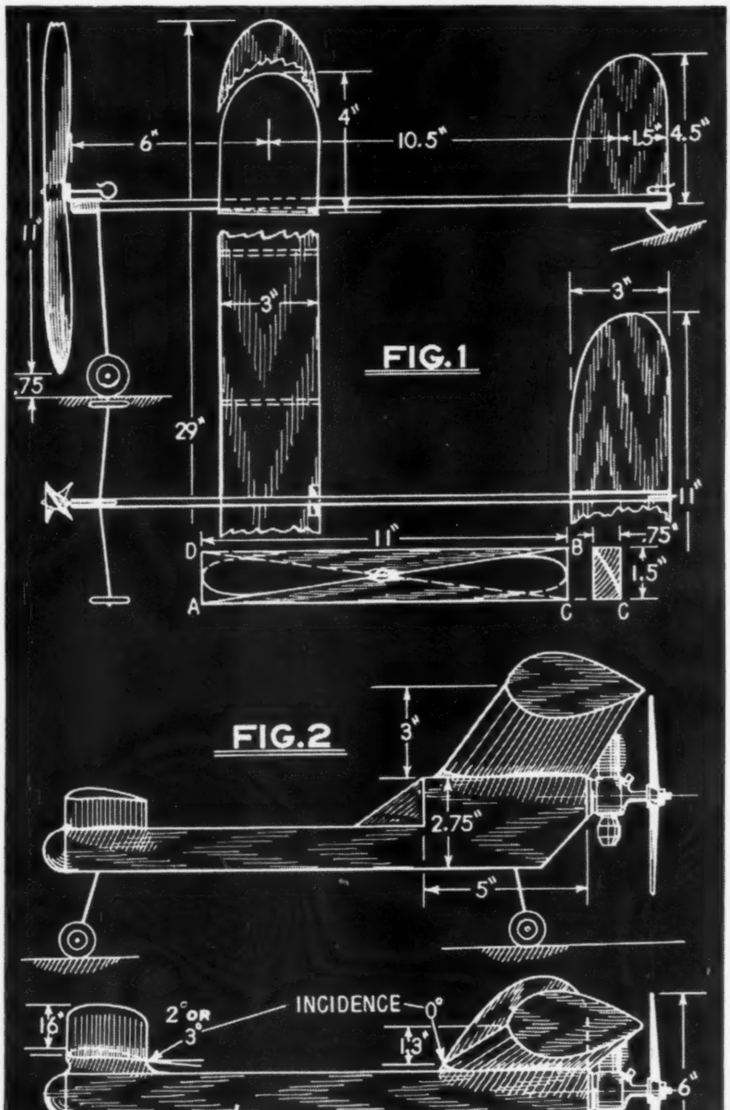


An experimental design by the author was proven out by ½A model

K. O. White's ½A F. F. Bristol Bullet (Ed Small holding) weighs only 6 oz.

A Brown-powered "C" job; old-timers used big engines for experiments

design forum



by CHARLES H. GRANT

THE mention of free flight models commonly brings to mind gas-powered planes of contest type and associated problems such as inconvenient and expensive crashes, due to improper design or adjustment, and out-of-sight flights when your model proves to be too good a flier. Many model builders feel you just can't win with free flight planes. Certainly a contest type of model usually does not provide suitable means for studying normal flight reactions and learning the fundamental rules that make for successful model designing and flying.

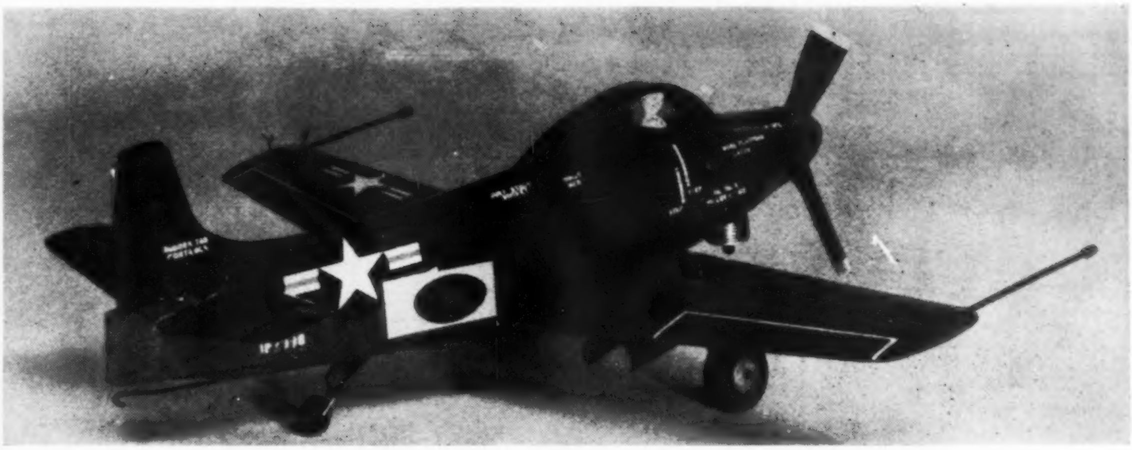
However, if the present day model builders were more familiar with the so-called rubber-powered sport model, we believe that their interest in free flight would be increased many-fold. Such models do not have the glamour and zip of a contest plane but they serve as an excellent means of studying flight reactions and adjustments. In this way they provide the vital information necessary to design and fly contest models successfully. We might say that for successful free flight contest flying, the model builder must pass through an intermediate stage; he must educate himself to some degree concerning flight reaction.

Apparently it is only the more serious minded modelers who have the patience to learn these fundamentals before entering the phase where they experience the thrills afforded by high power models, but contrary to general belief, this intermediate stage is not laborious nor uninteresting. Anyone who has built many well designed sport planes will obtain actually more pleasure than in contest flying. First of all, he can fly these models more often and in comparatively restricted areas without the danger of losing them. Such planes are especially interesting when they are light and fly slowly. These characteristics make it possible to adjourn to some park or open area for flight even within city limits, on a calm evening. This type of plane can be readily controlled and flown within these areas hour after hour. The effect of various adjustments may be noted, and a vast store of information may be obtained which will prove invaluable in all types of model flying.

Last month, and in several past issues, we have given a design for a basic all-balsa sport plane. The author built and flew a plane of this type twenty years ago, which he is still flying today. It is an excellent flier and with added power has reached an altitude as high as 400 ft. In the preceding issue we attempted to show the effect of locating the wing in various positions relative to the thrust line and the motor stick. There is one other interesting feature which may be demonstrated with this little plane and which will make it an extremely slow flier that may be used for sport and research in restricted flying areas.

Most modelers who have had any introduction to physics know that power is equal to *force* times *velocity*. When applied to a rubber motor and propeller this formula serves as a basis for design or modification of the propeller to serve various purposes. From this formula of $P = F x V$, it is obvious that when the airplane flies slowly (V is small), the force generated by any given power will be large. This simply means that with any given rubber motor or other power, the more slowly the propeller turns the greater the thrust will be. If the propeller is made so it turns rapidly, with the same power, most of the power will be absorbed by the forward speed of the airplane and little will be left for thrust. This means that if the airplane is constructed so it must fly fast to remain in flight, the delivered thrust will be comparatively small. If the airplane is designed to fly slowly and is of the same weight, delivered thrust will

(*Turn to page* 48)



model skyshark

by WALTER A. MUSCIANO

POWERED with two Allison T-40 turbo-prop engines driving contra-rotating Aeroproducts three-bladed propellers, the new Navy *Skyshark* can carry three 2000 lb. bombs, 300 gal. fuel tanks, torpedoes or *Tiny Tim* rockets plus eight 5" rockets under each outer wing panel. The high speed of the Douglas A2D design is so great that the standard 2000 lb. bombs had to be encased in a long streamline torpedo-like shape because the plane flew faster than the greatest speed of the standard bomb shape! All performance figures are top secret; however it is known that the *Skyshark* carries four times as many bombs per gallon of fuel as former jet attack planes and takes off in two thirds the distance of jet fighters. The static thrust is so high that this Douglas "brainchild" can take off from the smallest carrier, either as a fighter or bomber, with ample deck length margin.

According to E. H. Heinemann, Douglas chief engineer, the original idea was to merely modify the standard AD *Skyraider;* it soon became evident that an entirely new design had to be evolved. The main problem was to double the airplane's power without appreciably increasing the weight! The 5,500 horsepower twin Allison T-40 engines solved this problem. The powerplant is located behind and below the cockpit with the fuel tank immediately aft of the pilot. A firewall separates the tank and turbines. Air intakes are in the nose bottom behind the prop spinner while the exhaust blast emerges from the fuselage sides, aft of the wings. The powerplant is so arranged that one turbine can be shut down during flight, thereby increasing the cruising range of the A2D considerably.

The cabin is completely air-conditioned and an ejector seat is fitted. It is uncommon to see a fighting plane without the familiar bubble canopy; however it was considered necessary to use glass rather than plastic to meet hot sun, sea level and full throttle speed requirements. Double curvature glass of the type required was not available in time therefore the canopy was made as shown. Engine starting has been simplified to the point where the pilot merely pushes a button to start the turbo-prop engines. This is very important during combat preparations.

By combining high operating altitude, short take off, long range, high load carrying capacity and high speed approaching that of jet fighters, the *Skyshark* is particularly well suited as a carrier based attack, ground support or general purpose aircraft. Three planes are to undergo testing while ten more have already been ordered for Navy evaluation tests.

We wish to express our appreciation to Mr. C. G. "Chet" Miller, of the Douglas El Segundo Plant, for his kind cooperation in providing material to make this article possible.

Before we begin construction may we suggest that the A2D makes an ideal candidate for Navy "Carrier Landing" competition which was inaugurated at the Nationals this year. By fitting a two-speed engine control, using a *Remoto* control handle and possibly a third line for releasing the arresting hook, brother—it's perfect! Oh, yes—for those modellers who like to indulge in the unusual, why not fit this model with contra-rotating propellers?

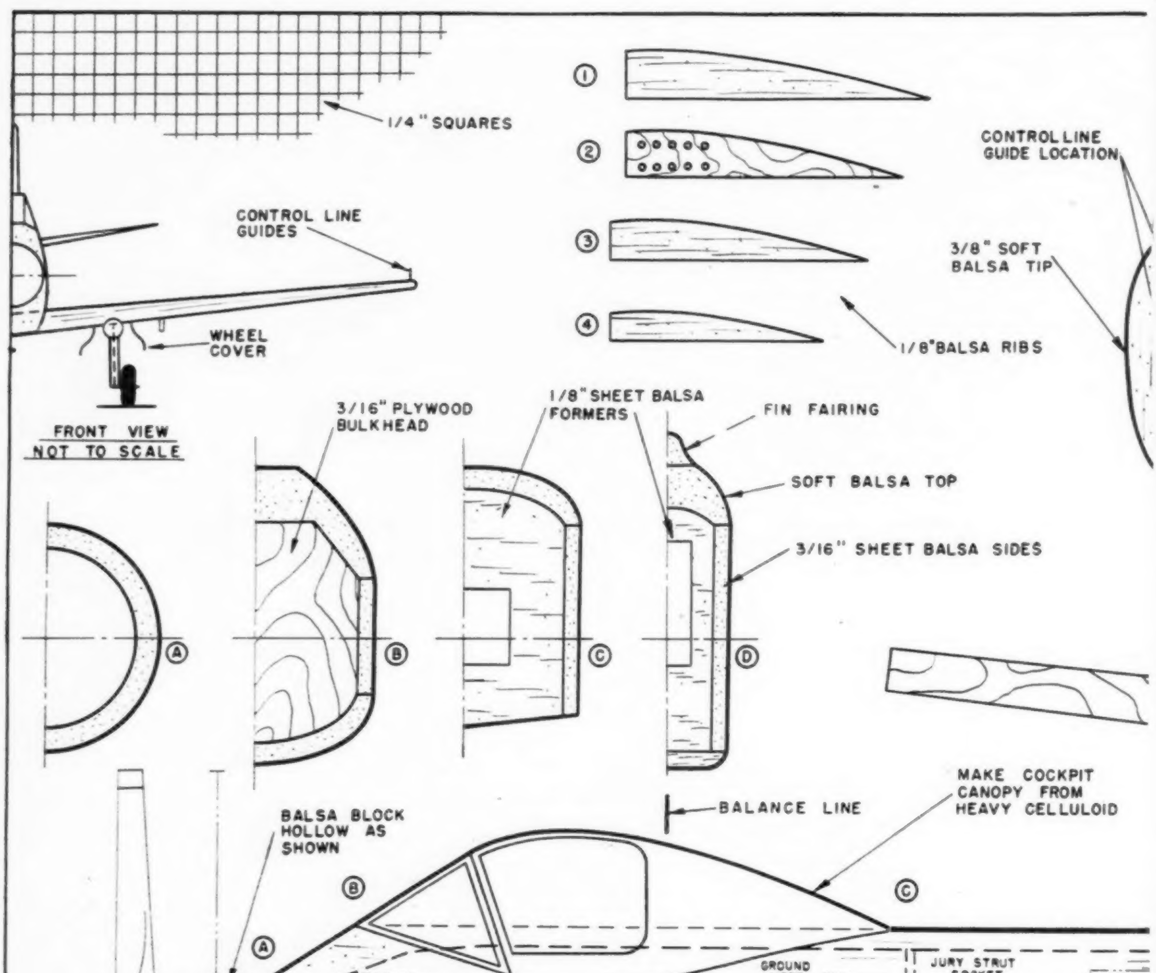
Now let's get started on the Navy's latest "flying arsenal." Select medium hard balsa for the fuselage sides but be sure that both sides are of the same texture. Cut out the bulkheads and cement the rear of the fuselage sides together and insert the bulkheads in their proper places. Apply plenty of cement. Install the engine and be sure all openings are sealed with tape. Add the bellcrank foundation and bolt the bellcrank to it. Cut the tail surfaces from medium balsa. Note that only one elevator is movable. Sand to a streamline shape and hinge the elevator to the stabilizer after the horn and spar have been added. Cement the stabilizer (both halves) to the fuselage top after the 1/16" wire control rod has been installed. Check for the correct dihedral. Install the fuel tank.

Cover the fuselage bottom and spot-cement the fuselage top and nose blocks in place. When dry carve the fuselage to shape, checking the cross-sections now and then. Sand smooth and slice the blocks off. Hollow to the approximate line shown on the plan and re-cement in place.

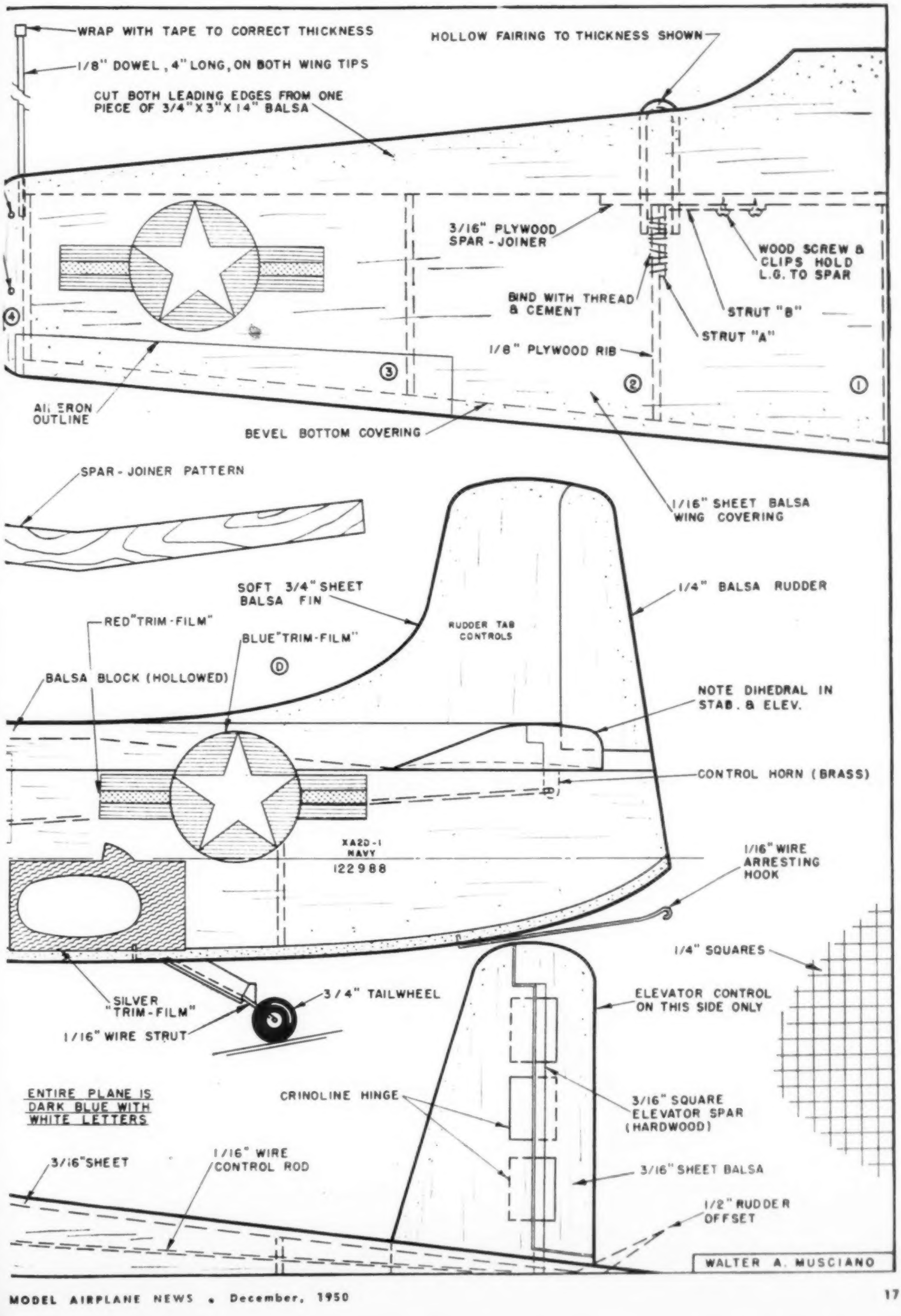
Cut the plywood wing joiner and ribs. Cement the rough cut leading edge to the joiner. Cement two pieces of 1/16" sheet together edge to edge, so you will be able to cut the wing covering in one sheet. Cement the bottom covering to the leading edge (one side at a time) and add the ribs.

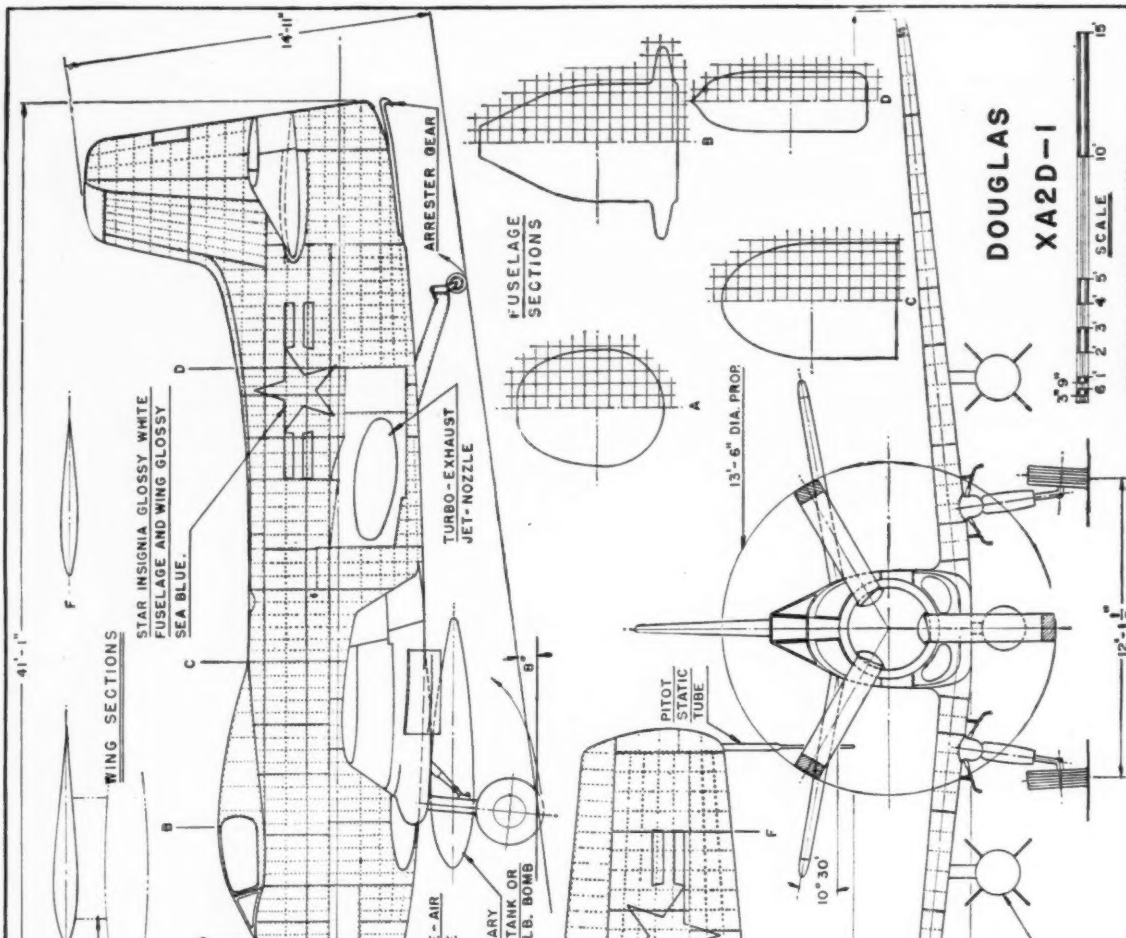
Now bend the landing gear to shape and bind the joint with fine wire (milk bottle cap wire is ideal) and solder well. Install the landing gear by inserting it through the wing from the top. A portion of the leading edge must be cut away for this. Bind strut "A" to the plywood rib with strong thread and cement liberally. Strut "B" is screwed to the joiner by means of small clips made of .032" dural. This landing gear stood up very well under rough handling on the early test flights. Bevel the trailing edge of the bottom covering and

(*Turn to page* 50)



1/4" SQUARES
1
2
3
4
1/8"BALSA RIBS
CONTROLLINE GUIDE LOCATION
3/8" SOFT BALSA TIP
CONTROL LINE GUIDES
WHEEL COVER
FRONT VIEW NOT TO SCALE
3/16" PLYWOOD BULKHEAD
1/8" SHEET BALSA FORMERS
FIN FAIRING
SOFT BALSA TOP
3/16" SHEET BALSA SIDES
A
B
C
D
BALANCE LINE
MAKE COCKPIT CANOPY FROM HEAVY CELLULOID
BALSA BLOCK HOLLOW AS SHOWN
GROUND HERE
JURY STRUT SOCKET
FUEL TANK
GROUND BEFORE FILLING
HOIST HERE
TURBINE WHEELS
STEP
CAUTION USE GASOLINE ONLY
THIS AIRPLANE IS EQUIPPED WITH AN EJECTION SEAT
CONTROL ACCESS
FUEL TANK
3/32" WIRE STRUT
STRUT "B"
STRUT "A"
SHEET TIN WHEEL COVERS
GLOW PLUG "OHLSSON .29" ENGINE .19 TO .49 CAN BE USED
REAR PROP. LOCATION
1-3/4" WHEELS
SEE TEXT FOR PROP.
BIND & SOLDER
WOOD, METAL OR PLASTIC SPINNER
BALSA BLOCK
3/16"PLYWOOD
1/16" DURAL BELLCRANK
1/2" SQ. HARDWOOD


WRAP WITH TAPE TO CORRECT THICKNESS
1/8" DOWEL, 4" LONG, ON BOTH WING TIPS
CUT BOTH LEADING EDGES FROM ONE PIECE OF 3/4" X 3" X 14" BALSA
HOLLOW FAIRING TO THICKNESS SHOWN
3/16" PLYWOOD SPAR-JOINER
WOOD SCREW & CLIPS HOLD L.G. TO SPAR
BIND WITH THREAD & CEMENT
STRUT "B"
STRUT "A"
1/8" PLYWOOD RIB
4
3
2
1
AILERON OUTLINE
BEVEL BOTTOM COVERING
SPAR-JOINER PATTERN
1/16" SHEET BALSA WING COVERING
SOFT 3/4" SHEET BALSA FIN
1/4" BALSA RUDDER
RED "TRIM-FILM"
BLUE "TRIM-FILM"
RUDDER TAB CONTROLS
BALSA BLOCK (HOLLOWED)
D
NOTE DIHEDRAL IN STAB. & ELEV.
CONTROL HORN (BRASS)
XA2D-1
NAVY
122988
1/16" WIRE ARRESTING HOOK
1/4" SQUARES
SILVER "TRIM-FILM"
3/4" TAILWHEEL
1/16" WIRE STRUT
ELEVATOR CONTROL ON THIS SIDE ONLY
ENTIRE PLANE IS DARK BLUE WITH WHITE LETTERS
CRINOLINE HINGE
3/16" SQUARE ELEVATOR SPAR (HARDWOOD)
3/16" SHEET
1/16" WIRE CONTROL ROD
3/16" SHEET BALSA
1/2" RUDDER OFFSET
WALTER A. MUSCIANO



DOUGLAS
XA2D-1
SCALE
DRAWN BY-LEONARD WIECZOREK
FUSELAGE SECTIONS
WING SECTIONS
ARRESTER GEAR
STAR INSIGNIA GLOSSY WHITE FUSELAGE AND WING GLOSSY SEA BLUE.
TURBO-EXHAUST JET-NOZZLE
ENGINE-AIR INTAKE
AUXILIARY FUEL TANK OR 2000 LB. BOMB
CO-AXIAL AERO PROP
PYLON
PITOT STATIC TUBE
13'-6" DIA. PROP.
5°30' SWEEPBACK
2000 LB. BOMB
WING GUNS
NOTE:
1. PROPELLER BLADES BLACK
2. PROPELLER TIPS ORANGE
ALLISON T40 POWER PLANT TWIN TURBO-PROP 5500 HORSEPOWER
41'-1"
14'-11"
6'-1"
20'-3"
50'-0 3/16"
12'-1 1/2"
10°30'
5°45'

douglas A2D-1

by Robert McLarren

THE United States has overtaken the much-publicized British lead in turboprop technology and there is every sign that it will not be relinquished—ever! But that is only half the story, since the U.S. has also taken a commanding lead in the difficult field of turboprop-powered aircraft design. For the U.S. now has not only the world's most powerful turboprop engines, but the most efficient by far; not only the world's biggest turboprop-powered airplane but the fastest as well.

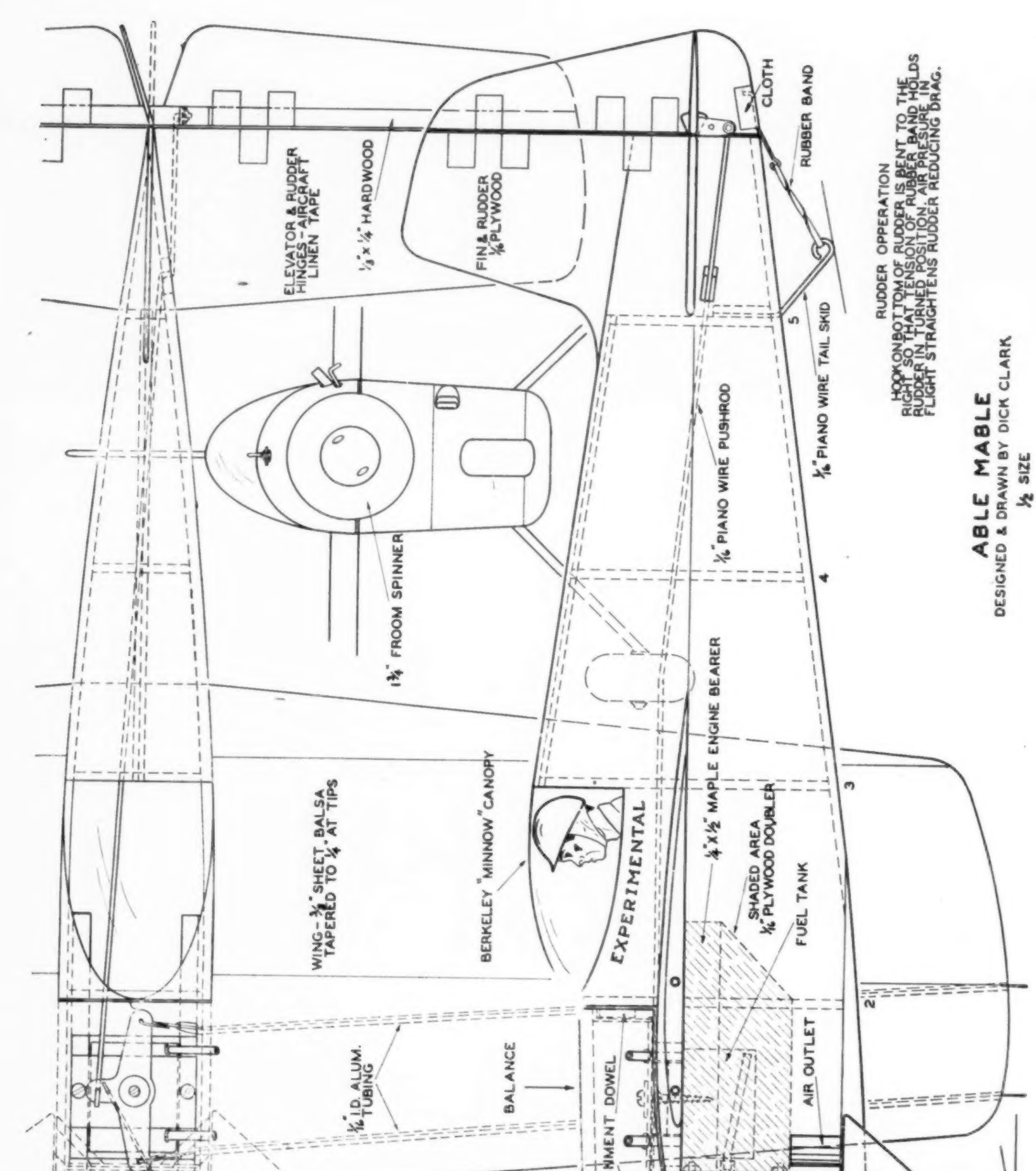
Unlike most of the elements of U.S. aeronautical world leadership, its lead in the turboprop field has been established only in the past few months and only after a spurt of hard, determined effort. It is an astonishing fact that the turboprop engine was born right here in the United States. Way back in 1939 inventive John K. Northrop conceived the idea of a gas turbine driven aircraft engine, this at a time long before the turbojet engine had been successfully developed. This idea, through a long series of difficulties, crystallized into the famous Northrop *Turbodyne* turboprop engine, easily the most powerful aircraft engine in the world. Recently purchased by the General Electric Co., the huge engine developed 10,000 hp, which is, at the moment anyway, more power on a single shaft than any airplane has accommodated.

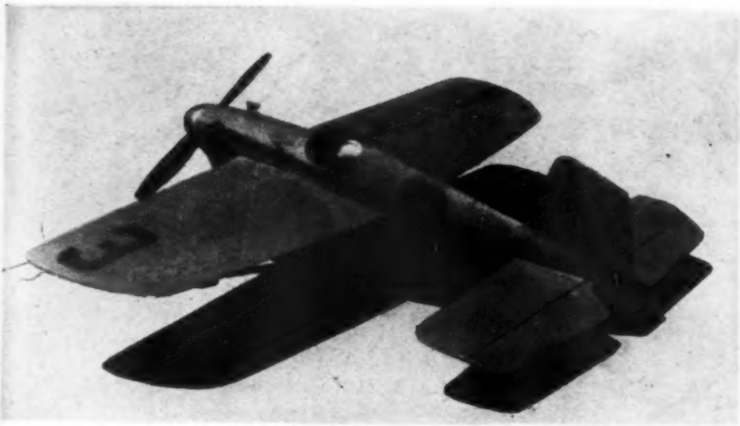
First turboprop engine to reach the test stand was—again—a U.S. product, the General Electric TG-100, which made its first test run on May 15, 1943. It was almost *two years* later that the first British turboprop made its first run; this was the Rolls-Royce *Trent* in March, 1945. Thus, these historical facts deny the impression of historical British leadership in this field, although none question their pioneering development of the straight turbojet engine, for which Sir Frank Whittle has been elaborately honored.

But a combination of factors late in World War II caused the U.S. to virtually cast aside its infant turboprop and default to the British, who continued to press its development with all speed. The impressive performance of the array of turbojet fighters then appearing (Lockheed F-80, Republic F-84, Gloster *Meteor*, DeHavilland *Vampire*, etc.) created a glamorous attraction for this engine that persists to this day in the fighter and interceptor phases of aircraft procurement. Fighter plane speeds crept past the 450 mph mark and pressed close to the 500 mph figure with conventional reciprocating engines. Engineers at the Air Force's Wright Field and the Navy's Patuxent Test Center quickly pointed to the propeller as the culprit in this handicapped piston-engine race with the turbojet fighter, whose speeds were already well past 600 mph and moving up. The formation of shock waves on propeller tips had been a wellknown fact since the 'twenties (the first supersonic research was performed on fast-turning propellers at Wright Field), and since it was realized that the speed of the air moving past a propeller is made up not only by the rotation of the blade but by its forward motion through the air. As the components of these two speeds increase, that tip portion of the blade undergoing shock losses spreads toward the hub with the result that at 500 mph nearly one third of the propeller blade length is suffering shock losses and its overall efficiency has dropped to as little as 50%. Thus, both Air Force, Navy and industry engineers set 500 mph as the ceiling on the speed of a propeller-driven airplane. Since neither the Air Force nor the Navy was interested in any 500 mph airplanes at a time when 600 mph airplanes were common, the future of the turboprop in the U.S. grew more clouded until it was *almost* shelved entirely! The Air Force flatly cancelled all its turboprop development contracts and washed its hands of the engine.

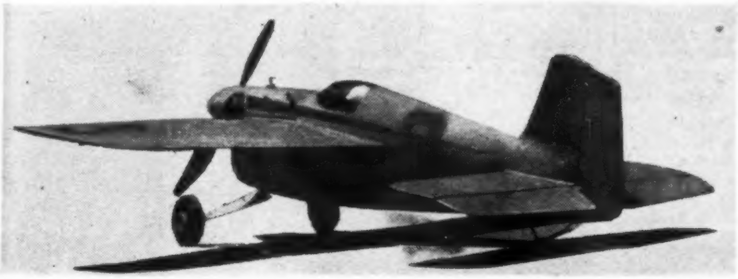
But that word "almost" is important here for, fortunately, there existed in the Navy Department a little band of engineer officers whose faith was unshaken in the engine. They admitted its limitations in the fast-climbing interceptor field but they recognized what the Air Force and even many Naval officers were overlooking: there's nothing wrong with a 500 mph bomber or attack plane (particularly back in those days when the Douglas SBD *Dauntless* was doing only

(*Turn to page 56*)


ABLE MABLE
DESIGNED & DRAWN BY DICK CLARK
½ SIZE
RUDDER OPPERATION
HOOK ON BOTTOM OF RUDDER IS BENT TO THE RIGHT SO THAT TENSION OF RUBBER BAND HOLDS RUDDER IN TURNED POSITION. AIR PRESURE IN FLIGHT STRAIGHTENS RUDDER REDUCING DRAG.
CLOTH
RUBBER BAND
1/16" PIANO WIRE TAIL SKID
1/16" PIANO WIRE PUSHROD
FIN & RUDDER 1/16" PLYWOOD
ELEVATOR & RUDDER HINGES - AIRCRAFT LINEN TAPE
1/8" x 1/4" HARDWOOD
1¾" FROOM SPINNER
WING - 3/32" SHEET BALSA TAPERED TO 1/16" AT TIPS
BERKELEY "MINNOW" CANOPY
EXPERIMENTAL
¼" X ½" MAPLE ENGINE BEARER
SHADED AREA 1/16" PLYWOOD DOUBLER
FUEL TANK
AIR OUTLET
BALANCE
1/16" I.D. ALUM. TUBING
1/8" ALIGNMENT DOWEL
1/16" PIANO WIRE SOLDER WASHER
NUTS SOLDERED TO PLATE
ENGINE - McCOY 29
1/16" PIANO WIRE BRACKET
TOP VIEW SHOWN WITH TOP COWL BLOCK REMOVED
VECO 1½" TREADED WHEEL
MOUNTING BRACKET .025 BRASS OR STEEL
FUEL TANK 1 OZ. .010 BRASS
1½"
1¼"
1"
1
2
3
4
5



able mable



Team racing is becoming more and more popular. Here's a ship that should speed this trend.

by DICK CLARK

TEAM racing, introduced two years ago on the West Coast, is still very new to many localities. If you haven't yet tried it you are missing some of the biggest thrills you can get from flying model planes, including the thrill of direct competition with your opponents from the start of the first lap to the checkered flag at the end of the race.

But team racing is not all thrills. Winning a feature race is only the final result of a lot of preparation on the part of the team of pilot and mechanics. Although this type of event deals with speed, it is the elapsed time from the beginning of the race to the end of the last lap that determines this speed. There are several things which affect this elapsed time, the flying speed of the plane being only one. The number of laps the plane will fly on its 1 oz. tank, and the rapidity with which the mechanics can refuel and restart the model are also determining factors, and they can mean the difference between winning and losing.

Of course a very important part of the team is the model itself. Team racing is grueling business for both men and machines—just ask a mechanic at the end of a 140-lap feature event! The plane must be able to stand up under several heat races and one or two long races as well, with no time out for repairs nor even for inspection for impending failures. At the same time it must handle easily during the confusion of a race when the pilot must continually be glancing around to keep track of other pilots and planes. Also it must have good take-off and landing characteristics. A plane with bad take-off habits (which seem quite prevalent among team racers) can not only cause trouble for its pilot, but also for the other pilots in the race as well. And a broken prop on landing means losing the race almost certainly.

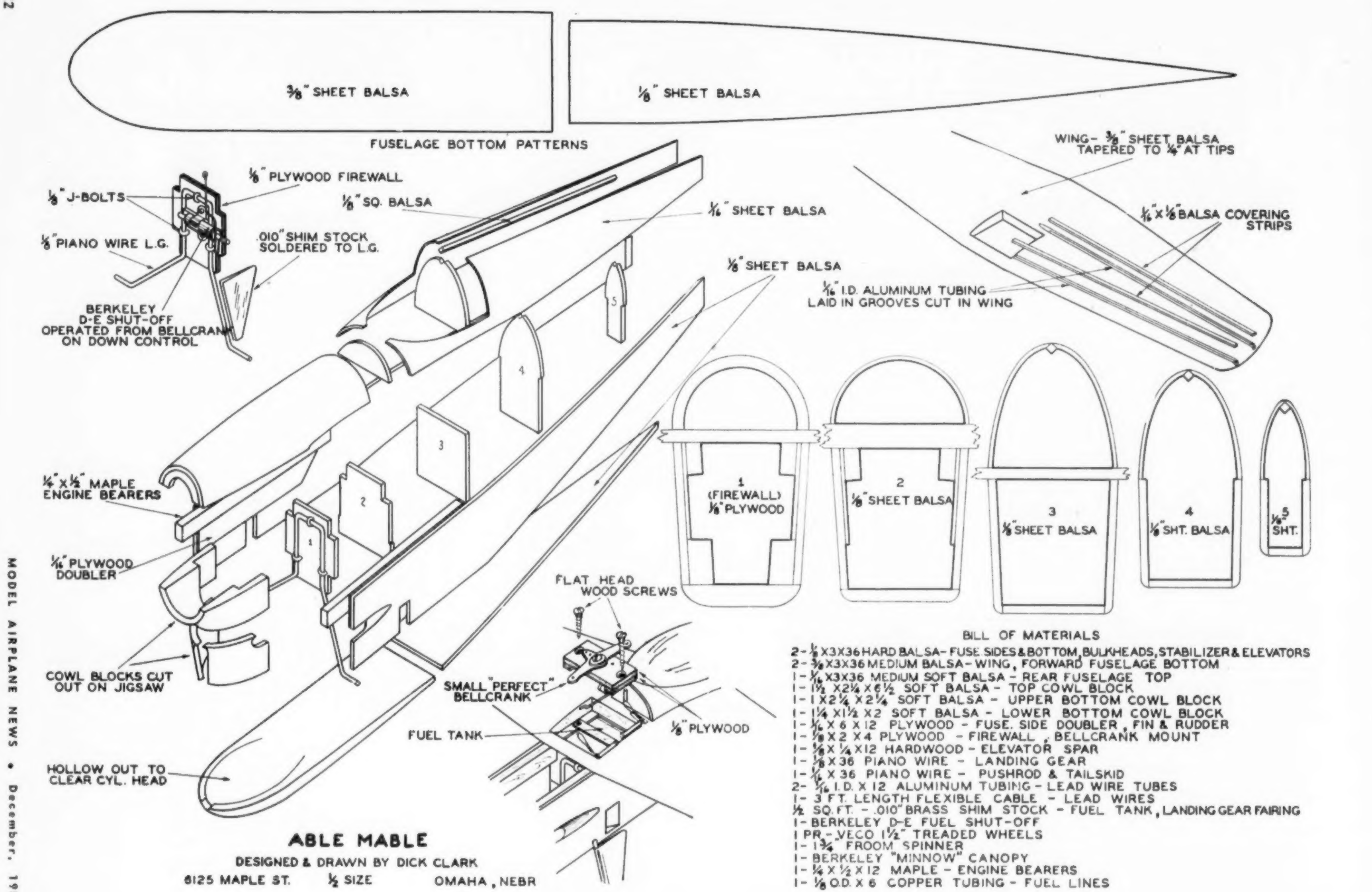
Able Mable is a development of two seasons in team racing competition, and was designed to give the best possible performance under the conditions encountered in this type of flying. It features light weight, rugged yet simple construction, ease of maintenance, and clean lines. The original model weighs just 21 oz., has a top speed of 94 mph, flies 39 laps at 82 mph. and has been flying in competition for 5 months.

Before starting construction it will be necessary to enlarge the plans to full size. This can easily be done since they are printed half size. If you do not wish to enlarge them yourself you can obtain a full size set, or have them photostated up to the correct size.

Fuselage: Cut the two sides from 1/8" thick hard balsa sheet to outline shown on plans. Cut two 1/16" plywood doublers, indicated by shaded area on plans, and cement in place on sides of fuselage. Now cement the 1/4" x 1/2" maple engine bearers to the fuselage sides over the doublers. While allowing these side assemblies to dry, cut out the 1/8" plywood firewall and 1/8" sheet balsa bulkheads. Bend the 1/8" piano wire landing gear to shape and install on fire wall with 1/8" J-Bolts, being sure not to obstruct the air outlet openings in the firewall. Cement a piece of 1/8" sheet balsa between upright legs of landing gear as a mount for the fuel shut-off. Next fasten fuel shut-off to firewall with a bracket made from brass shim stock.

Assemble the fuselage sides to firewall and bulkheads, using clamps and pins to hold it together while the cement sets up.

(*Turn to page 58*)



BILL OF MATERIALS

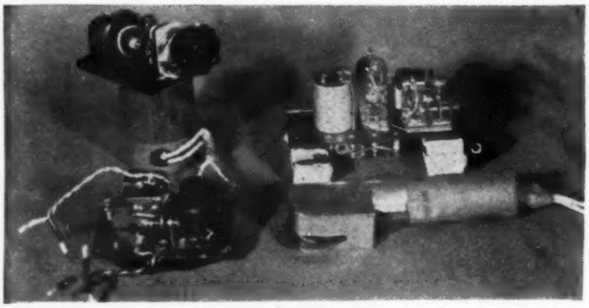
2 - 1/8 X 3 X 36 HARD BALSA - FUSE SIDES & BOTTOM, BULKHEADS, STABILIZER & ELEVATORS
2 - 3/8 X 3 X 36 MEDIUM BALSA - WING, FORWARD FUSELAGE BOTTOM
1 - 1/16 X 3 X 36 MEDIUM SOFT BALSA - REAR FUSELAGE TOP
1 - 1 1/2 X 2 1/4 X 6 1/2 SOFT BALSA - TOP COWL BLOCK
1 - 1 X 2 1/4 X 2 1/4 SOFT BALSA - UPPER BOTTOM COWL BLOCK
1 - 1 1/4 X 1 1/2 X 2 SOFT BALSA - LOWER BOTTOM COWL BLOCK
1 - 1/16 X 6 X 12 PLYWOOD - FUSE. SIDE DOUBLER, FIN & RUDDER
1 - 1/8 X 2 X 4 PLYWOOD - FIREWALL, BELLCRANK MOUNT
1 - 1/8 X 1/4 X 12 HARDWOOD - ELEVATOR SPAR
1 - 1/8 X 36 PIANO WIRE - LANDING GEAR
1 - 1/16 X 36 PIANO WIRE - PUSHROD & TAILSKID
2 - 1/16 I.D. X 12 ALUMINUM TUBING - LEAD WIRE TUBES
1 - 3 FT. LENGTH FLEXIBLE CABLE - LEAD WIRES
1/2 SQ. FT. - .010" BRASS SHIM STOCK - FUEL TANK, LANDING GEAR FAIRING
1 - BERKELEY D-E FUEL SHUT-OFF
1 PR. - VECO 1 1/2" TREADED WHEELS
1 - 1 3/4" FROOM SPINNER
1 - BERKELEY "MINNOW" CANOPY
1 - 1/4 X 1/2 X 12 MAPLE - ENGINE BEARERS
1 - 1/8 O.D. X 6 COPPER TUBING - FUEL LINES

ABLE MABLE

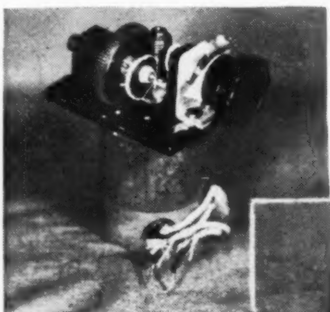
DESIGNED & DRAWN BY DICK CLARK
6125 MAPLE ST. 1/2 SIZE OMAHA, NEBR

simple proportional control

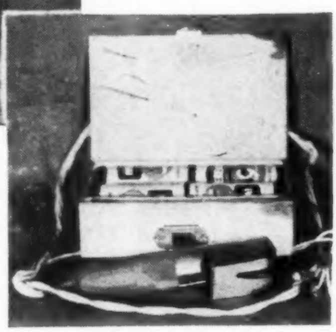
PART TWO



Above. Several control units; at upper left and lower right are pulsing units. Other items are assemblies for pulse rate control



At left, simple pulsing unit shown in drawing on page 24



Right, miniature pulser with box of cells which hangs on belt

Below. The author gets ready to fly his latest R.C. ship

by GEORGE E. TRAMMELL

LAST month we covered the reasons for using pulse control on R.C. models, the primary reason being that we can get proportional control; the amount of control the model receives is proportional to the movement the pilot gives with his control stick. Either gentle or tight turns may be executed at the will of the pilot. The next reason is simplicity and reliability. Also it is possible to add another control which may be operated on the same radio but independently of the first. This extra control operates by varying the pulse rate; it is either on or off at will, and is well suited for operating the throttle.

The construction of the control *actuators* developed by the writer were covered in the last issue. This month we will take up construction of the pulsing unit, which is the pilot's control. Also the pulse rate unit and wiring diagrams will be explained.

While it is quite possible to use an electronic system to produce the pulses, it has worked out much cheaper and easier to build a mechanical pulsing control. Therefore we will confine this description to the latter.

The main requirement of the pulsing unit is that the transmitter keying contacts in the unit must be varied by the pilot's control stick. While the motor driven cam speed governs the *rate* of make and break, the pilot's control stick governs what proportion of the time the contacts will be closed or open; the proportion of on- to off-time of the transmitter is therefore controlled by the stick. When the stick is in the center, or at neutral, the contacts should be closed for half a turn of the cam, and open the other half turn. As the stick is moved right, the contacts should stay *closed* a greater proportion of the time; when it is moved left, they should stay *open* a greater proportion of the time. The extreme limits of the control stick movement should be barely sufficient to keep the contacts closed or open all the time.

An electric motor and gear train are arranged to turn a cam at a maximum speed of about 600 rpm, or 10 turns per sec. Against this cam rides a hinged arm carrying one of the transmitter keying contacts. The other keying contact is so arranged that it is moved by the control stick. It is important that the cam on the control stick have just enough throw to hold the contacts together when in its extreme right position, that is—the motor driven cam will barely miss the contact arm. Of course, in its extreme left position, the contact arm should ride the motor cam for its complete revolution without the contacts quite making.

Referring to the drawing in Fig. 1, we see one of the simplest forms of pulsing unit. The motor and gears were picked up at the local junk yard. Although the motor is rated at 27 v. DC, it was found to run at about the right speed on 6 v. The contacts were taken from an old telephone-type relay, although pieces cut from spring brass or bronze would do as well. The contact arms are insulated from each other by a stack of sheet fibre.

Fig. 2 shows a compact little job, which was built by the writer's brother, Mark. He used a *Rev Motor* or *Electrotor*, and a worm and gear from an electric clock. The contacts are ignition points that came off his *K & B Torp* when it was converted to glow operation. The bearings and shafts are brass tubing and piano wire from the local hobby shop, and the case is fuel tank material from the same source. He uses a box, containing four large flashlight batteries, clipped to his belt to power the motor in this pulsing unit.

These two control units so far have no provision for changing the pulse rate to operate the second control. If your motor and gears work out to something like nine or ten revolutions a second, a rheostat may be used to reduce the speed to about a third this rate for the slow pulse rate. By connecting a push-button or a switch across the rheostat, the speed, and consequently the pulse rate, can be changed with only a slight delay.

Because of this delay while the motor is changing speed, and the fact that some motors don't run very steadily on reduced voltage, it has been found preferable to change the pulse rate by another method. Referring to Fig. 3, there is a single lobe cam and a three lobe cam on the same shaft. Each cam has a separate contact arm riding on it. The contact arms which are moved by the control stick are made as a single wide arm with a contact to match each of the contacts on the two arms which ride the cams. A single pole double throw switch connects the transmitter keying line to one or the other of the sets of contacts. One of the photographs shows a two-channel double cam control box which the writer has used for

(*Turn to page 60*)

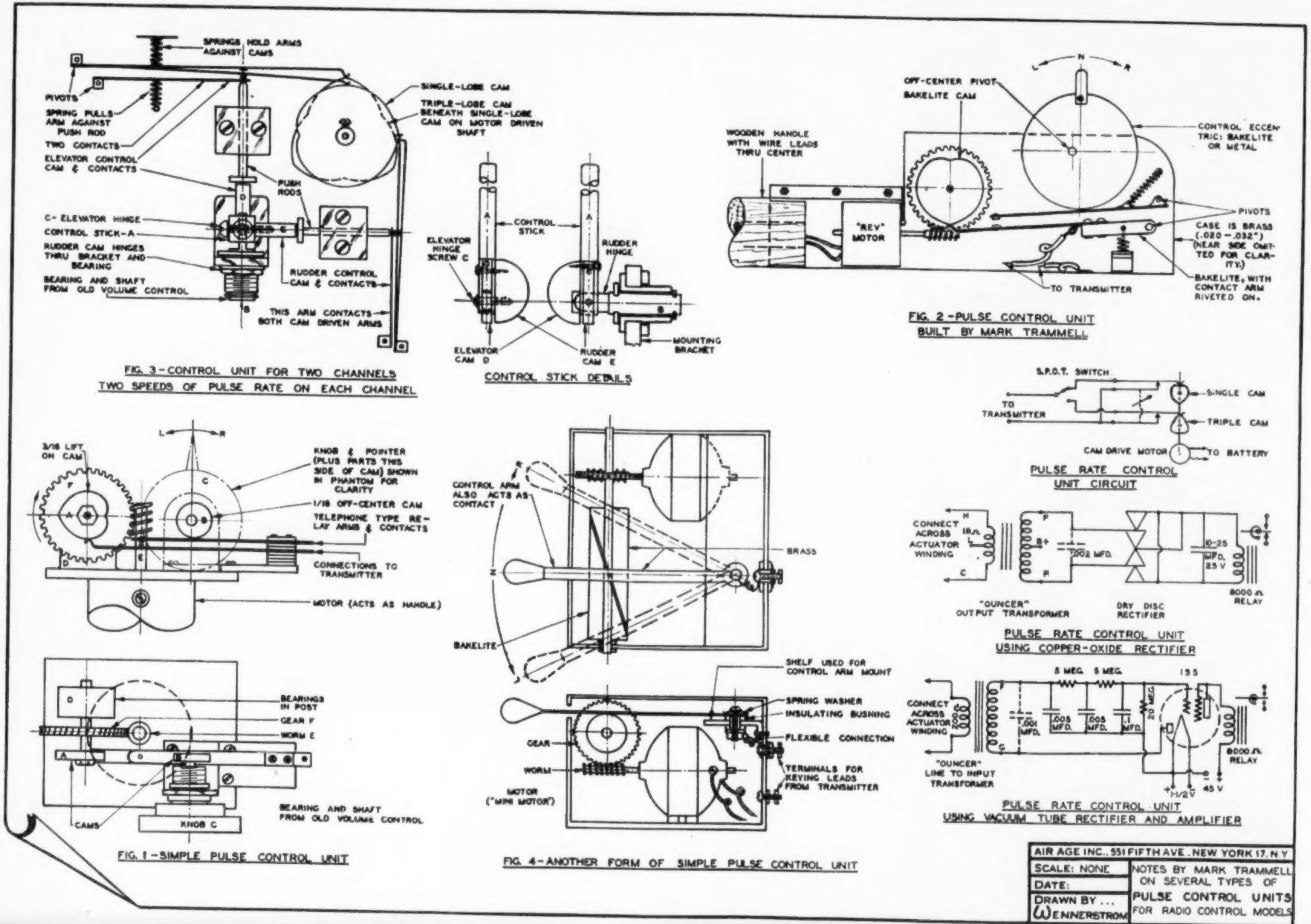


FIG. 3 - CONTROL UNIT FOR TWO CHANNELS
TWO SPEEDS OF PULSE RATE ON EACH CHANNEL

CONTROL STICK DETAILS

FIG. 2 - PULSE CONTROL UNIT
BUILT BY MARK TRAMMELL

PULSE RATE CONTROL UNIT CIRCUIT

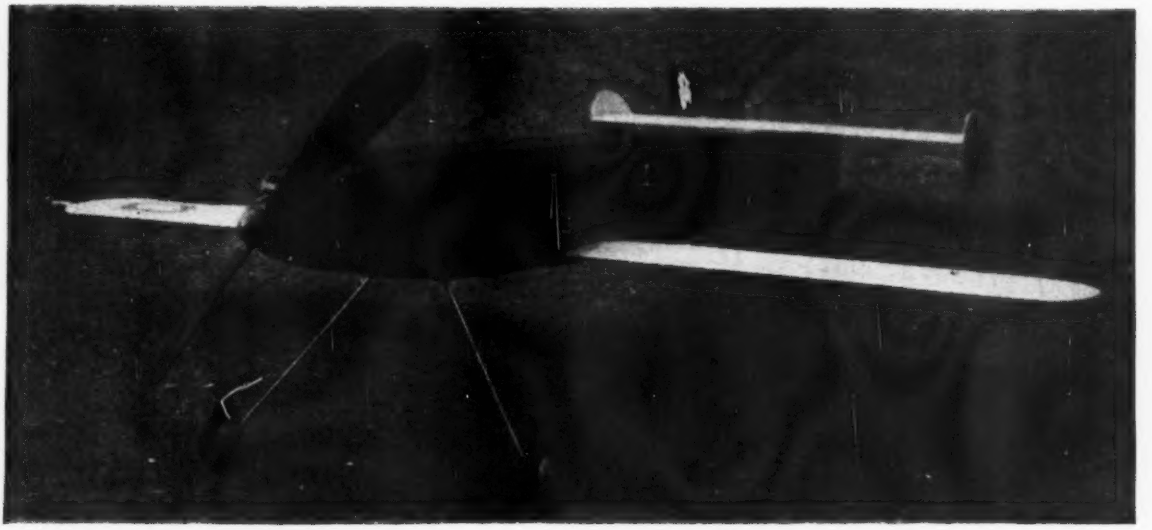
PULSE RATE CONTROL UNIT
USING COPPER-OXIDE RECTIFIER

PULSE RATE CONTROL UNIT
USING VACUUM TUBE RECTIFIER AND AMPLIFIER

FIG. 1 - SIMPLE PULSE CONTROL UNIT

FIG. 4 - ANOTHER FORM OF SIMPLE PULSE CONTROL UNIT

AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.	
SCALE: NONE	NOTES BY MARK TRAMMELL ON SEVERAL TYPES OF
DATE:	PULSE CONTROL UNITS
DRAWN BY ... WENNERSTROM	FOR RADIO CONTROL MODELS



90 M.P.H. with rubber

by PAUL E. DEL GATTO

You don't need a gas engine for speed—try it this way!

WHENEVER model builders group around to discuss speed models, the item which receives the most attention is the powerplant. With gas engines as popular as they are, and with jet and diesel engines following close behind, rubber is seldom discussed as a source of power for speed models.

Yet, just prior to the last war, in the late '30's and early '40's, model builders were constructing and flying rubber-powered speed jobs which could do between 80-90 M.P.H. over a prescribed straight line course. However, this required a great deal of skill both in adjusting as well as in design, since the models flew free-flight. There were too many problems to cope with.

First there was the take-off. If the model did take off, you then had to worry about whether it would climb, barrel-roll, or just veer off the course. If everything was okay up to this point, you then had to worry about the landing, which more often than not resulted in damaging the model. With the advent of U-control, rubber speed models faded from the model building scene.

It was not until early in 1946 while a member of the *Bronx Aero Club*, that we heard of other clubs conducting indoor rubber powered speed model contests during the winter months. This sounded like a good way to pass an evening and to revive some of the competitive spirit so prevalent during the summer months. A set of rules were drawn up to eliminate the troubles encountered with speed models of the past.

Since torque was the major problem, it was decided to have the models fly in a circle about a center post. Fifteen feet was the selected radius, in view of the limited floor space since the planes were rubber-powered, it was necessary to begin timing almost immediately. Therefore, we decided to allow the model one half lap to take-off and accelerate. The model was then clocked for one complete lap. Three official flights were to be allowed each contestant, with three delayed flights accounting for one official flight, a delayed flight being one in which the model did not take-off in the first half lap, or did not complete one full lap before any part of the model touched the ground. The highest speed recorded by each contestant would then be used to determine the winner.

To John E. Gluth went credit for achieving the top place speed of 76 M.P.H. at the first contest. The model was very simple in design, being constructed entirely from sheet balsa. The landing gear was a two wheel affair, thus insuring a rapid, steady take-off.

One of the most unusual models of the contest was the result of the combined efforts of John Thompson and Robert Syvanen. The fuselage was diamond shaped, with a low aspect ratio elliptical wing and stabilizer made from sheet balsa. The landing gear was a single strut affair with a streamlined piece of lead at the bottom which balanced the model. Although the model appeared capable of doing 85-90 M.P.H., difficulty in trimming for flight eventually resulted in heavy damages, thus forcing it out of the contest.

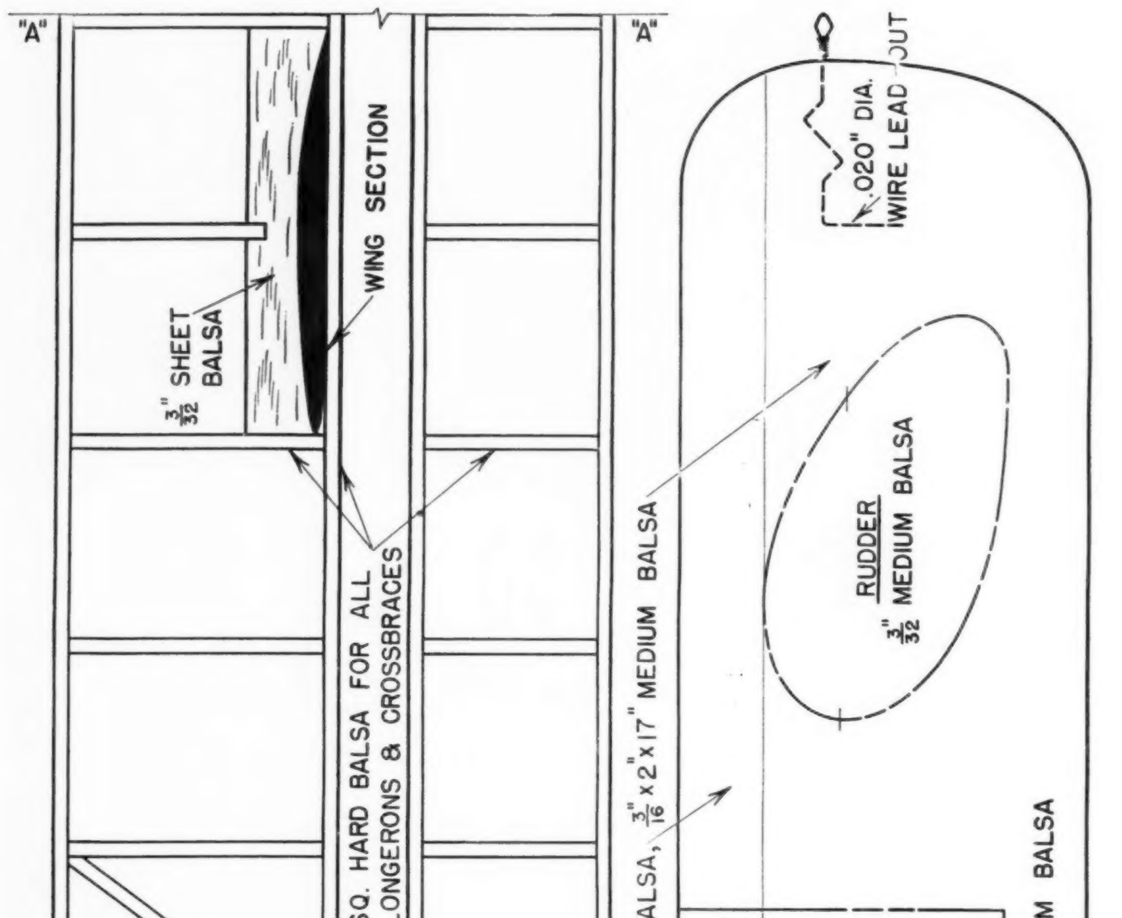
The simplicity of the rules, the ease and rapidity with which a contest could be run, the small expenditure of time in-

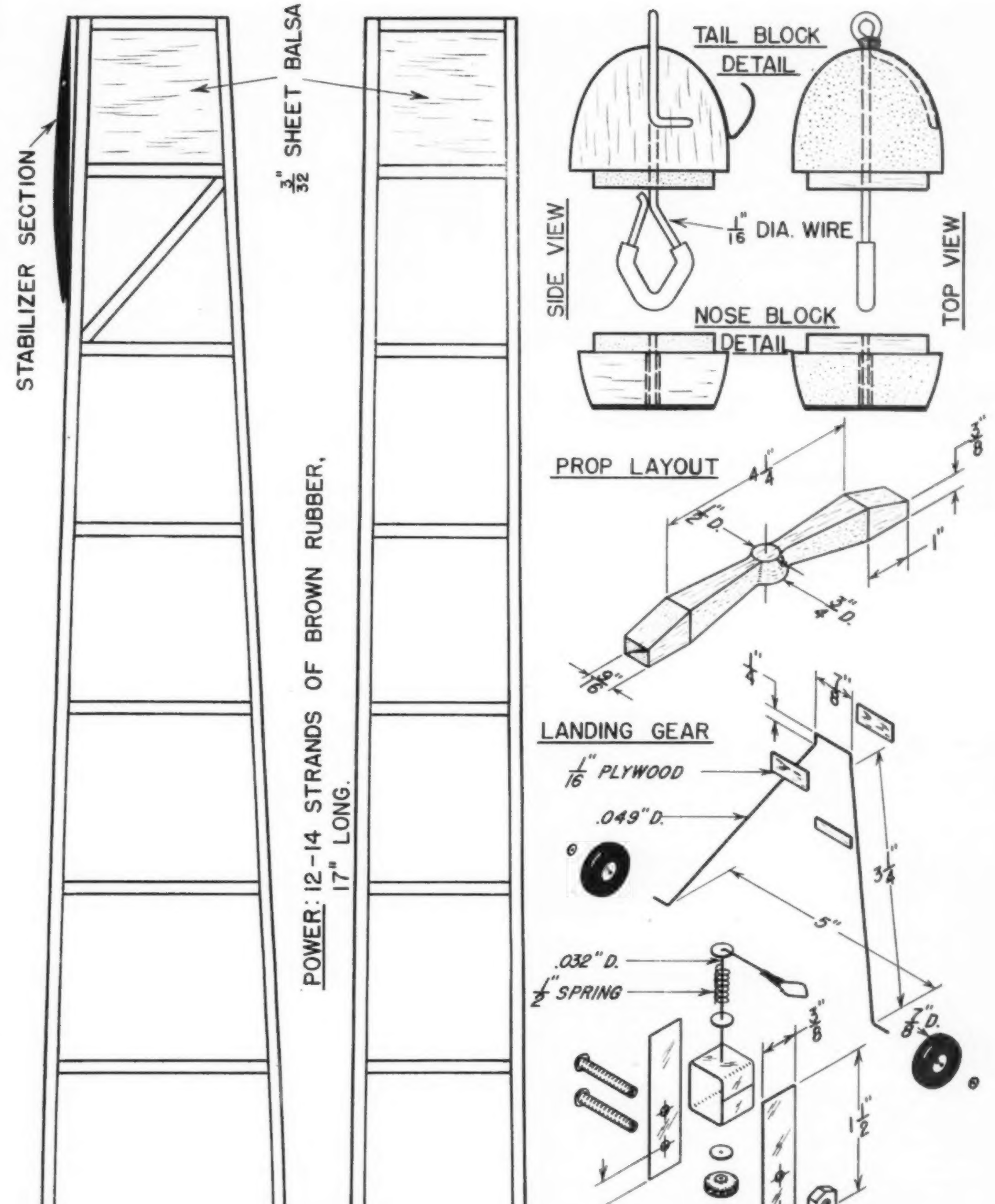
volved in constructing a rubber-powered speed model, and the small amount of space required to run such a contest, make this event ideal for a club contest.

The *Blue Streak* presented here is ideal for such an event. It represents the culmination of an all-out effort to obtain a high degree of streamlining while maintaining simple lines, thus insuring rapid construction. So, if you've got an hour to spare every day for just one week, you can build yourself a model that will pay big dividends in thrills and chills.

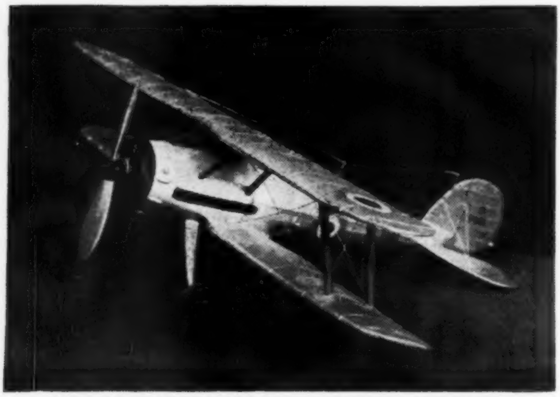
Since the plans are full size, all that remains to be done is to join the fuselage plans at "A-A". If you prefer, you can just trace over the outline which has very

(*Turn to page 46*)

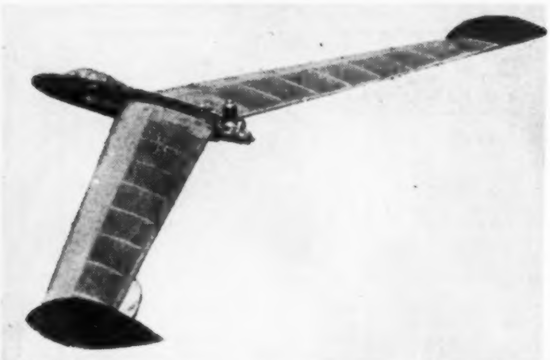

"A"
"A"
3/32" SHEET BALSA
WING SECTION
3/32" SQ. HARD BALSA FOR ALL LONGERONS & CROSSBRACES
LANDING GEAR POSITION
3/32" SHEET BALSA
WING- 3/16" x 1/2" x 17" HARD BALSA, 3/16" x 2" x 17" MEDIUM BALSA
NOTE
EXCEPT FOR SKETCHES, DRAWINGS ARE SHOWN FULL SIZE.
STABILIZER- 3/32" x 2" x 6 1/2" MEDIUM BALSA
RUDDER
3/32" MEDIUM BALSA
.020" DIA. WIRE LEAD OUT
Blue Streak


STABILIZER SECTION
3/32" SHEET BALSA
POWER: 12-14 STRANDS OF BROWN RUBBER, 17" LONG.
"A"
TAIL BLOCK DETAIL
SIDE VIEW
TOP VIEW
1/16" DIA. WIRE
NOSE BLOCK DETAIL
PROP LAYOUT
4 1/4"
2" D.
3/8"
1"
9/16"
LANDING GEAR
1/16" PLYWOOD
.049" D.
1/4"
7/8"
3 1/4"
5"
.032" D.
1/2" SPRING
7/8" D.
3/8"
1 1/2"
1/4"
CENTER POST ASSEMBLY "A"
2 FT.
3/8"
NOTE
BEARING & MOUNTING BRACKETS MADE FROM .015 BRASS & SOL.
P.D.G.

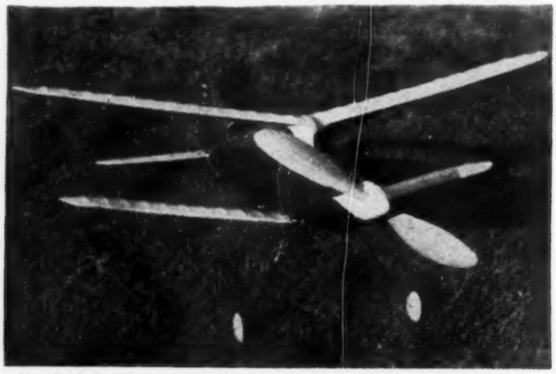
No. 1—Lt. Tom Mahon flies this *Mercury* in Germany



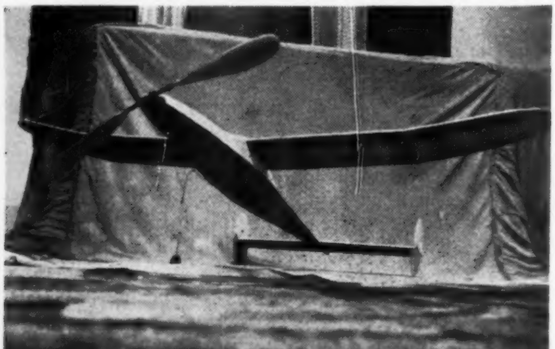
No. 2—Scale Gloster *Gladiator* made of tin cans by E. Flores



No. 3—Crazy *Rhythm*, Bud Johnson's ½A free flight "wing"



No. 4—Something special! It's G. H. Berry's biplane Wakefield model



No. 5—A more conventional Wakefield from Australia by F. Bethwaite

air ways

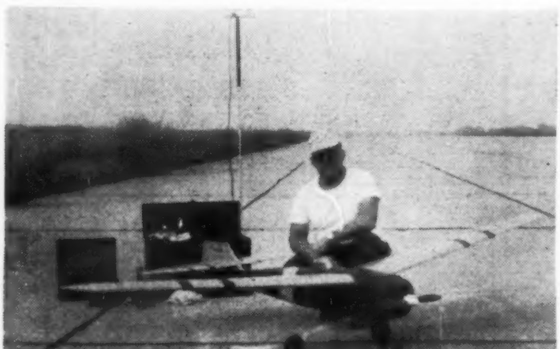
News of Model Airplane Experimenter All Over the World

THE INDOOR SEASON is fast approaching for most of us; this means more indoor club activity—meetings, programs to keep up member interest and the like. At every club where it has been tried, the members insist that there is nothing as good for keeping up interest as the holding of contests in whatever quarters are available. Some groups are fortunate enough to have large areas such as gymnasiums or armories available, and here the contest possibilities are almost unlimited. For such areas, and where it is allowed, the use of ½A engines in various types of ships is a natural. An example of this is the indoor team racing described by Fran Ptaskiewicz in our July 1950 issue. If you have considerable space but gas engines are banned, consider rubber-powered speed ships, such as that detailed on page 25 of this issue. These are ideal for indoor use, and the speeds attained are surprising.

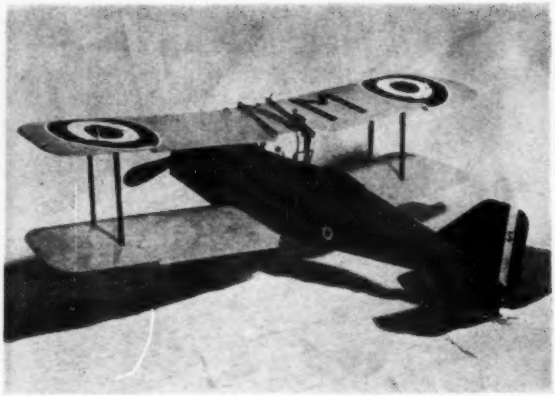
Scale model indoor duration contests have been popular in some areas. One approach to this was described on page 47 of the May 1950 M.A.N.; the *Tech Model Aircrafters* of Massachusetts Institute of Technology, Cambridge, Mass. originated a scale model contest with a few novel twists that add to the fun and excitement. Further details of this and other indoor contests were given in Air Ways, May 1950 issue.

And then there is R.T.P. flying; you never heard of it? Well, it simply means "round the pylon," and is a very popular event in England. The planes are around 16" span and of fuselage type, though not scale models. As the name implies, they are tethered to a small pylon by a single thread. Since duration is the main object, the planes are very lightly built, and times clocked up are surprisingly high.

Well, these are just a few of the possibilities—try some of



No. 6—Frank Madl uses *Rockwood R. C.* equipment in this *Custom Cavalier*



No. 7—Exact scale S.E.5 is the work of Kenneth Jensen

No. 8—Mario Syracuse holds Luscombe model fitted with neon lights

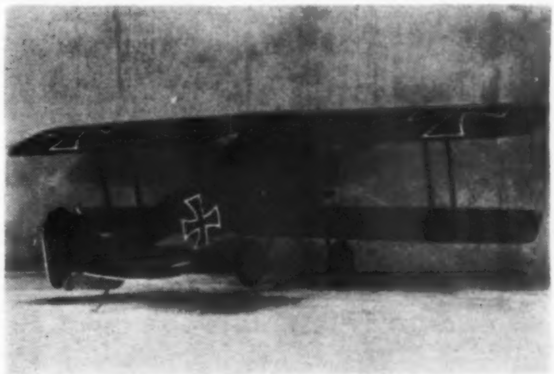
them or dream up your own; but even if you just fly simple gliders, make use of these indoor contests to keep up interest and excitement at your club during the winter months.

NOT LONG AGO we told you of the "occupant" of a PAA-Load plane at the Dallas Nationals who was buried with honors, after the plane had suffered a major crack-up. Now we learn from Bob Buragas of another hazard faced by these occupants. Telling of a recent meet on Long Island, Bob writes:

"Frank Ehling came along with his latest *Forster*-powered PAA-Load ship. Frank's ship was short a little right thrust so that it flew in a very tight left turn. The turn was so tight that the ship was chasing its tail and gaining very little altitude Then it happened! Frank found the one discrepency in the present PAA-Load rules. The centrifugal force was so great that an occupant went sailing. Personally I feel that a rule specifying parachutes for occupants is a must. Two flights later a second occupant bit the dust. The score? Total time 1:20, one wheel lost in flight and two occupants dropped to a miserable death." We agree with Bob that the rules will have to be amended to cover this new hazard.

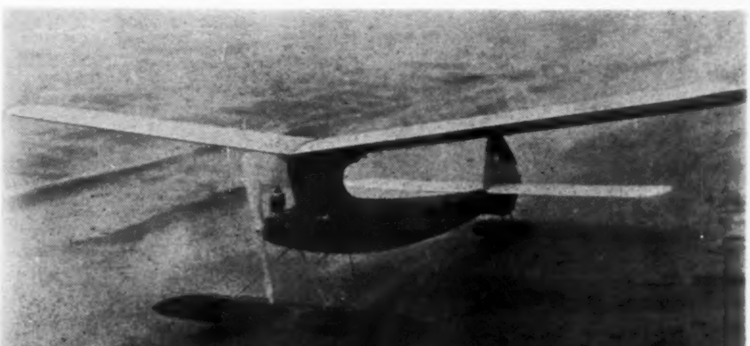
THE OLD PROBLEM of space in which to fly is always with us. One of our readers, Walter R. Pearsall writes: "The biggest problem that faces us who live in cities, such as Washington, is the problem of space in which to fly. Here in D.C., it necessitates a trip of approximately ten miles out of town before you can find a half-way suitable location. I believe that this could be partially solved, by the modelers banding together in each city, then with the publicity and backing of A.M.A., a representative group could approach the city officials and gain permission to use some land in the suburbs or one of the nearby areas—a location, of course, that would be within easy reach of all local modelers. With all of the Clubs banding together, a rental fee could be paid for such a strip of land. I believe that this is not a new idea, since the modelers in Baltimore have had a field of their own for some time. Mr. Krug, Secretary of the Interior, was kind enough to consider the Washington control liners plea for a flying site and has fixed us up with a very nice fenced in area. I certainly hope that something can be done for the free flighters, since the Nationals show that free flight is on the upswing again (for which I loudly cheer)."

(*Turn to page* 51)



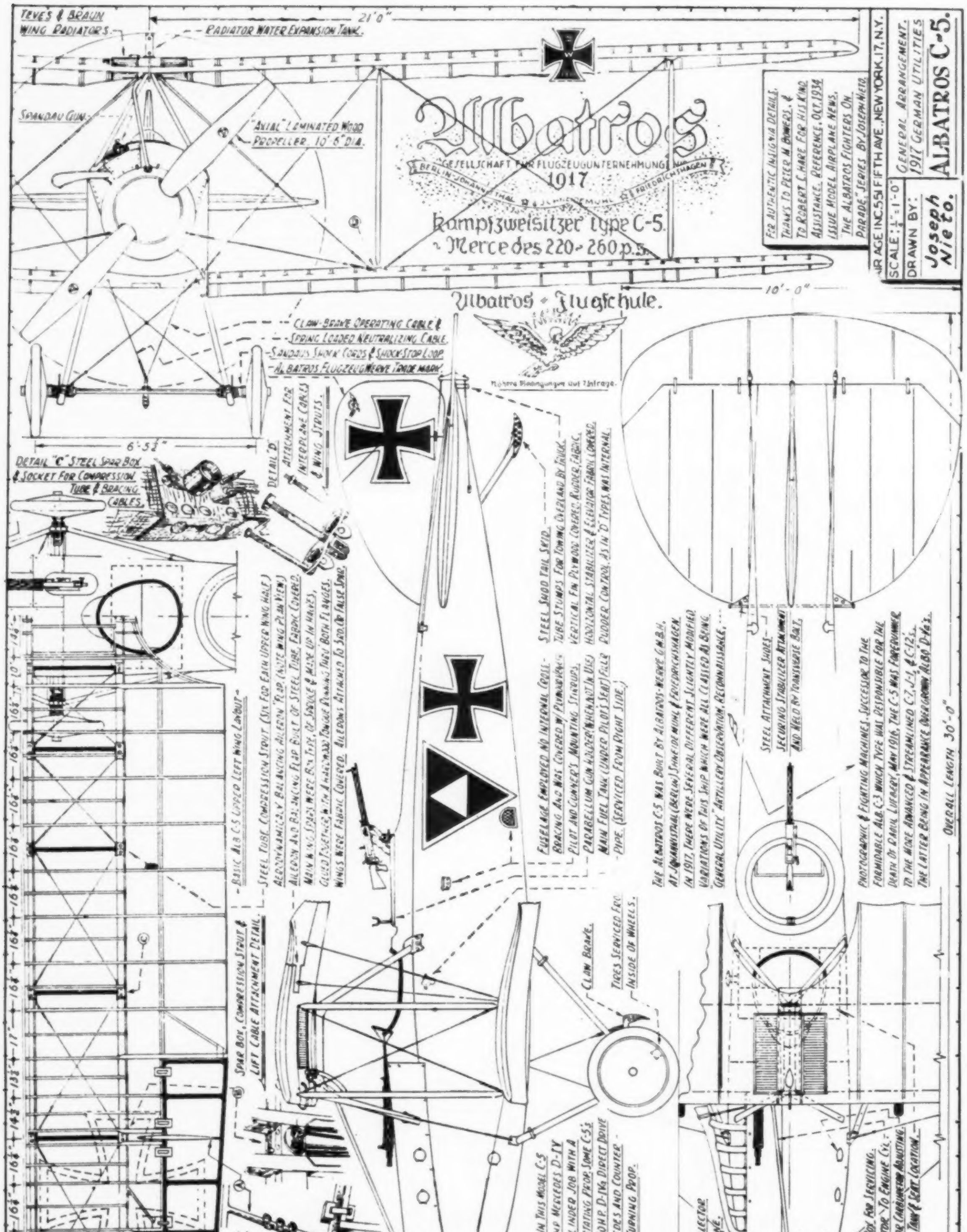
No. 9—Roland D-2 built from Nieto plans in M.A.N. by Lt. J. Appleby

No. 10—Jet-powered free flighter built from *Sailplane* parts by G. Codding

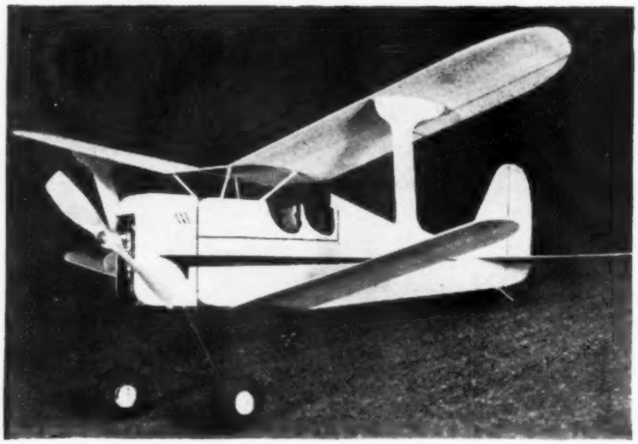


No. 11—Very successful seaplane designed by Bruce Lester uses Cub. 049 engine

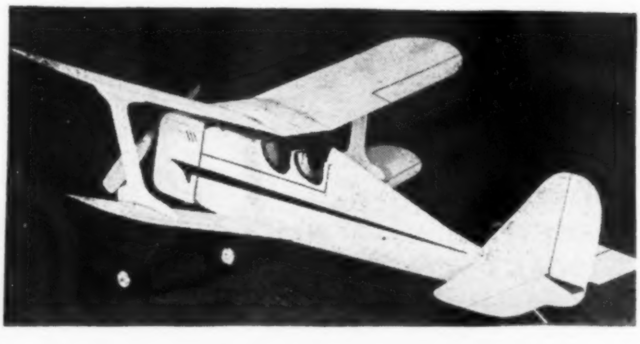
No. 12—John Marotta holds uncovered *Yogi*



TEVE'S & BRAUN WING RADIATORS.
RADIATOR WATER EXPANSION TANK.
21'0"
SPANDAU GUN.
"AXIAL" LAMINATED WOOD PROPELLER, 10' 6" DIA.
Albatros
GESELLSCHAFT FÜR FLUGZEUGUNTERNEHMUNGEN
BERLIN-JOHANNISTHAL
FRIEDRICHSHAGEN
1917
Kampfzweisitzer type C-5.
Mercedes 220-260 p.s.
Albatros - Flugschule.
10'-0"
CLAW-BRAKE OPERATING CABLE & SPRING LOADED NEUTRALIZING CABLE.
SANDOWS SHOCK CORDS & SHOCK STOP LOOP.
ALBATROS FLUGZEUGWERKE TRADE MARK.
6'-5½"
DETAIL "C" STEEL SPAR BOX & SOCKET FOR COMPRESSION TUBE & BRACING CABLES.
DETAIL "D"
ATTACHMENT FOR INTERPLANE CABLES & WING STRUTS.
FOR AUTHENTIC INSIGNIA DETAILS, THANKS TO PETER M. BOWERS, & TO ROBERT C. HARE FOR HIS KIND ASSISTANCE. REFERENCE: OCT. 1934 ISSUE MODEL AIRPLANE NEWS. "THE ALBATROS FIGHTERS ON PARADE" SERIES BY JOSEPH NIETO.
AIRAGE INC. 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: ⅛" = 1'-0"
DRAWN BY: Joseph Nieto.
GENERAL ARRANGEMENT. 1917 GERMAN UTILITIES
ALBATROS C-5.
OVERALL LENGTH 30'-0"
11'-10½"
30 MIN.



LAIRD BIPLANE



by DICK STRUHL

ONE of the cleanest biplanes to appear in the 1936-37 era was the Laird R300 light cargo carrier. Based upon the Laird Thompson Racer, this three-place utility model retained all the racing lines and performance of a Thompson Trophy winner.

Powered with the Wright *Whirlwind* of 330 hp, this plane had a top speed of 175 mph and cruised at 155 mph. The landing speed was 50 mph, with a service ceiling of 20,000'.

We present our version of the Laird in semi-profile form powered with the *Campus A-100 CO2* engine. The model is not completely drawn to scale. Certain liberties were taken from the true scale plans to insure a top-notch flying model. The dihedral angle, the tail surface area, the landing gear design and location, and other factors have to be modified in the interest of flying, and the result is well worth the cribbing from scale. Our little model has a very consistent stable flight path at all times and under all weather conditions. This little job has been flown on windy days when you wouldn't dare drag a larger model out of the car. And best of all, being so light, the plane is practically indestructible.

The strength and durability of the model is due to the sheet balsa type of construction employed. You can't beat this construction for small models, and if the material is chosen carefully, you can keep the weight of your model Laird down to 3/4 oz.

Study the plans well before you attempt construction. All parts are shown full size and in their entirety. No duplicating right and left panels!

Make the wings first. Trace the top wing onto a sheet of 1/32" balsa 2-1/2" x 15", marking the dihedral breaks and the center line, but do not cut as yet. Do the same for the lower wing on a piece of 1/32" x 2-1/16" x 12". Note that the dihedral break on the lower wing coincides with the center line. On the *underside* of the wings, brush on one coat of clear dope from the leading edge to a point about two-thirds of the wing chord. Set the two wings aside to dry. This procedure will automatically form the necessary airfoil camber in the wing when dry.

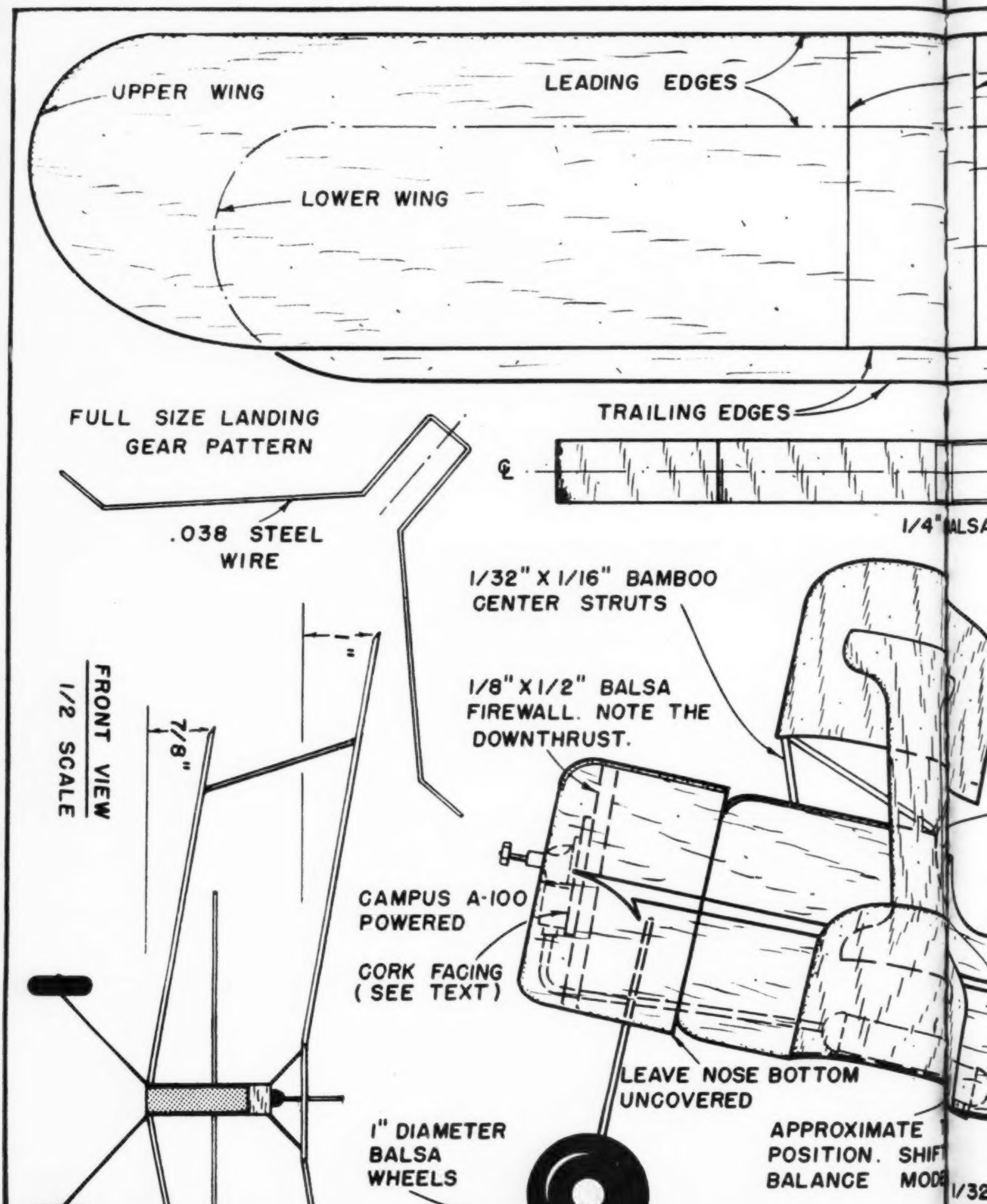
The fuselage is merely a thin rectangular box just wide enough to enclose the engine and tank. First, cut two fuselage sides from light 1/20" or hard 1/32" sheet balsa. On the inside portion of one, mark the position of the firewall and the two bulkheads. Cement the bulkheads and firewall in place on this side. Note that the firewall has downthrust built into it. Now cement the other fuselage side in place and check alignment. When the cement has set, fasten the fuselage top and bottom pieces in place. No bottom covering is used around the cowl and the portion of the fuselage just in front of the lower wing. This will permit easy removal and installation of the engine and tank. Bend the landing gear to shape from .038" music wire and cement in place to the insides of the fuselage side pieces. Apply several coats of cement and also dope a small piece of cloth over the joint for extra security. Carve the headrest from soft 1/4" balsa and cement in place.

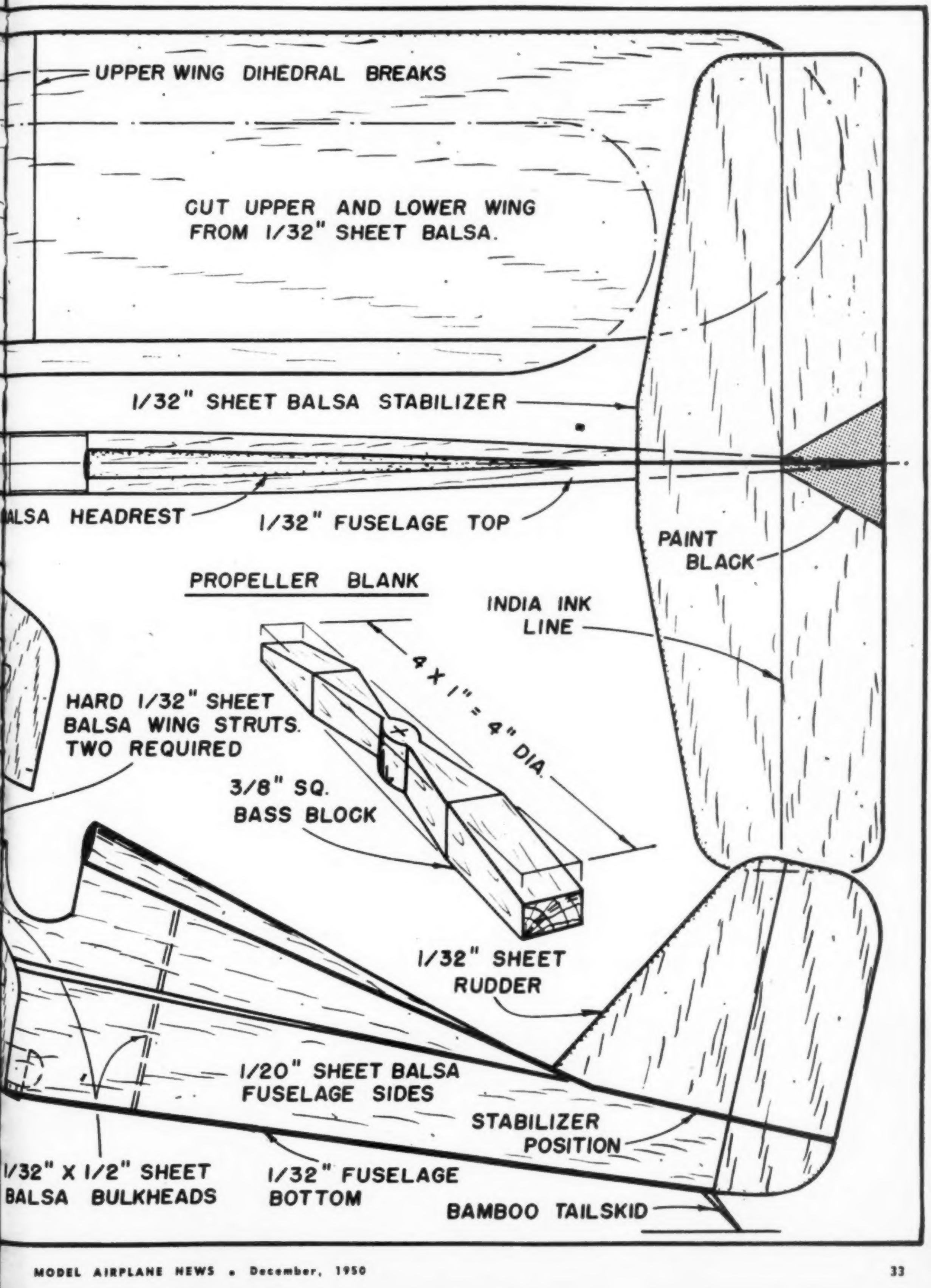
The tail surface is cut from 1/32" flat sheet balsa. Note that the stabilizer is one piece, while the rudder is in two pieces—one piece entirely above the stabilizer and a smaller portion below the stabilizer. Rather than using a rudder cutout in the stabilizer, we merely apply black dope to that portion to simulate the cutout for greater strength.

Now to complete the wings and assemble the plane. The wing panels should have assumed an airfoil shape when the dope on the underside dried and contracted. If not bent completely to shape, you can mold the sheet slightly with your fingers. Cut the panels apart at the dihedral breaks and install the proper amount of dihedral as shown in the front view. Cut two outer wing struts from hard 1/32" sheet balsa as shown in the side view.

When the cement has set, install the lower wing in place in the notch provided for it in the fuselage. Use two coats at this joint. Now cement the struts to the bottom wing and allow to dry. When the cement has set, but not dried completely, drop the top wing in place and, looking at the front and top views, check the alignment of the wings and fuselage. If any alterations are needed, now is the time to make them before they dry. Cement the top wing to the

(*Turn to page 47*)


UPPER WING
LEADING EDGES
LOWER WING
TRAILING EDGES
FULL SIZE LANDING GEAR PATTERN
.038 STEEL WIRE
1/4" BALSA
1/32" X 1/16" BAMBOO CENTER STRUTS
1/8" X 1/2" BALSA FIREWALL. NOTE THE DOWNTHRUST.
FRONT VIEW 1/2 SCALE
7/8"
CAMPUS A-100 POWERED
CORK FACING (SEE TEXT)
LEAVE NOSE BOTTOM UNCOVERED
1" DIAMETER BALSA WHEELS
APPROXIMATE
POSITION. SHIF
BALANCE MOD
DICK STRUHL


UPPER WING DIHEDRAL BREAKS
CUT UPPER AND LOWER WING FROM 1/32" SHEET BALSA.
1/32" SHEET BALSA STABILIZER
ALSA HEADREST
1/32" FUSELAGE TOP
PAINT BLACK
PROPELLER BLANK
INDIA INK LINE
4 X 1" = 4" DIA.
HARD 1/32" SHEET BALSA WING STRUTS. TWO REQUIRED
3/8" SQ. BASS BLOCK
1/32" SHEET RUDDER
1/20" SHEET BALSA FUSELAGE SIDES
STABILIZER POSITION
1/32" X 1/2" SHEET BALSA BULKHEADS
1/32" FUSELAGE BOTTOM
BAMBOO TAILSKID

SEEN AT THE NATIONALS

J. B. Oberthier of Plainview, Texas, holds his well made Team Racer

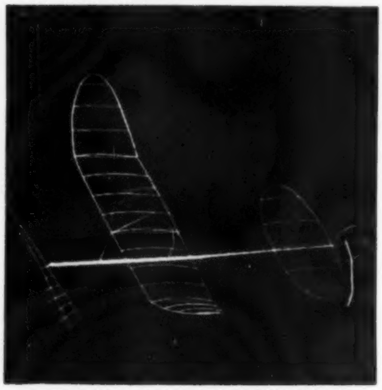
Carl Gelin of the *Lubbock Eagles* checks alignment on Class B O & R 23-powered Cumulus

Waiting to be processed; this chore was handled very rapidly at Dallas

Don Tune (right) of Beverly Hills gets *Tulsa Glue Daubers* Trophy for high time in H-L glider

Bill Krecek holds aloft his Focke-Wulf entry in the Rubber Scale event

First place in Rubber Scale went to this Stinson L-5 entry of Paul Gilliam

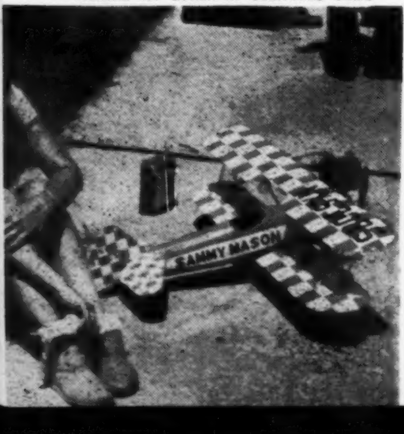


Jim Lempkes winning Indoor Stick ship in flight at Will Rogers Colosseum in Ft. Worth

The waves don't look so bad in this view of the R.O.W. site—but ask the boys who flew!

Add these views to our Nationals coverage in the last two issues for a complete picture of the big event

Famous "Sammy Mason" stunt plane is readied for action in Controline Scale



Denny Davis of "San de ——" fame with Modelcraft award for winning Class A Open

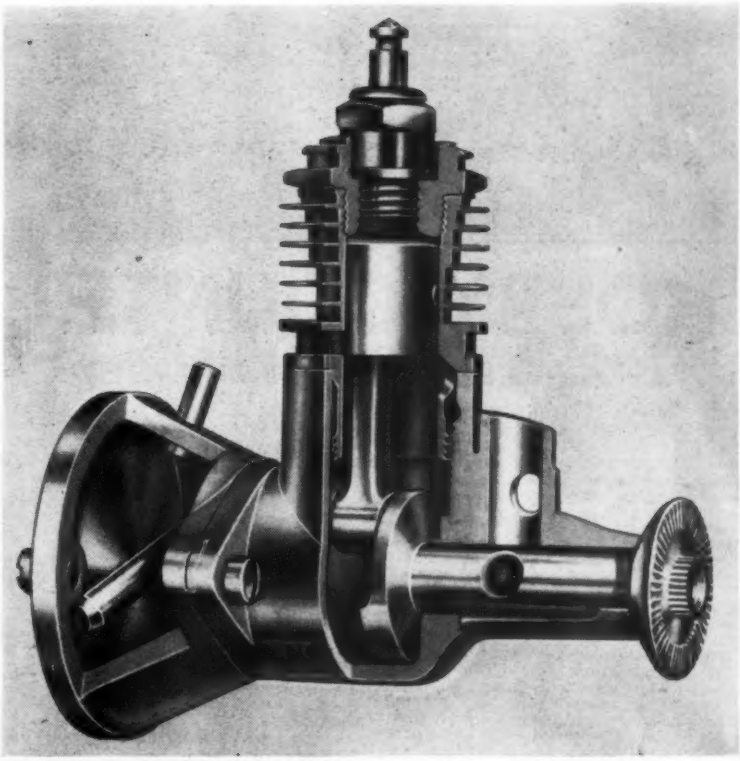
Historic Bloomingdale Award went to Joe Bilgri for longest flight in Indoor Cabin Open.

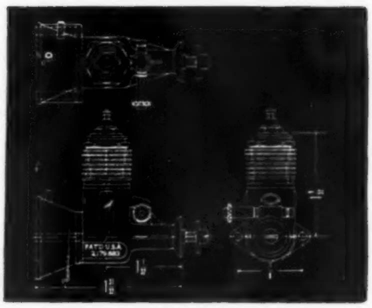
ENGINE REVIEW

The ½A's are still coming; here's a new one to be added to the "O.K." line

The New "OK" .039

by JOSEPH MUTTY





COSTS in most hobbies have advanced with the cost-of-living index in general. Miniature engine manufacturers, however, have consistently reduced prices while improving their products—paradoxical to the price trend. In the '30's a dependable miniature fuel engine retailed for $20 or more; today, a far superior performer costs considerably less than half that amount.

The new "*OK*" *.039* glow plug engine, designed by Charles Brebeck, Sr., is an outstanding example of today's values in miniature engines. This power plant is designed and priced to interest more boys in converting rubber-band models to fuel-powered models, and attract new numbers of beginners to the growing sport of model plane building and flying. It is a complete "power package" including integral fuel tank, plastic propeller and spin starter. Designed for easy starting and top-flight performance for beginners, but not expressly intended for youngsters, it has the detailed refinements sought by experienced hobbyists.

Manufacturing costs were reduced through advancements in simplified and unique designing, and no compromise has been made with "*OK*" specifications of quality metals nor in the micrometric precision of moving and fitted parts.

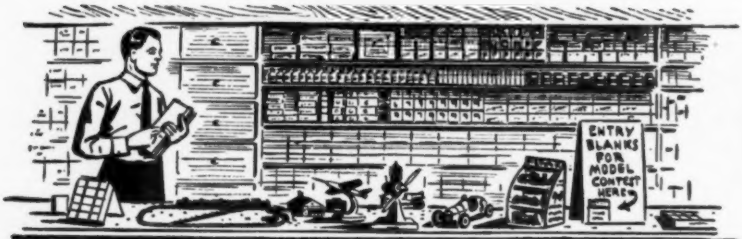
The "*OK*" *.039* has a bore of .390 and .336 stroke, conforming closely to the "*OK*" *.074* in bore/stroke ratio. The weight including fuel tank is approximately 1¼ oz. In tests conducted with "*OK*" *Cub* Glow Fuel this miniature turned up 11,500 rpm with its 5½" x 4" plastic propeller, and speeds up to 15,500 rpm with smaller propellers. This exceptionally high power/weight ratio is attributed to the Brebeck-designed porting (Patent No. 2,179,683) in which fuel is carried from the crankcase to a chamber below the mounting flange, entering the cylinder through three holes. These holes are located in the bridges between the exhaust ports. The result is efficient and effective radial induction and scavenging of exhaust gasses. The conventional, sensitive needle valve is easy to adjust for a smooth flow of maximum power.

Production for this new miniature engine has been set up parallel with the rigid manufacturing standards of all "OK" engines. All castings are high-pressure-process aluminum alloy, providing maximum density and strength in these accurately die-cast parts. The cylinder is a full-length steel barrel, machined from solid bar stock, and provided with five evenly-spaced fins; it is heat treated for hardness before bore is lapped. The hexagonal aluminum alloy head seats the glow plug and can be removed or replaced with standard wrenches. The high-carbon steel piston is heat treated and ground to proper precision tolerance with the lapped cylinder. The counterbalanced crankshaft is made from low carbon steel, hardened to resist wear, and ground to close-tolerance fit with bearing surfaces. The main bearing is .220" diameter and the crank pin is .125" diameter, providing relatively large bearing surfaces to resist wear. Precision fitting of rugged balanced parts maintains the smooth-as-silk operation over long periods of flying service.

The propeller drive washer is press-fitted onto a serrated section of the crankshaft, and as a precaution against serious crash damage the propeller is attached to the crankshaft with a separate mounting bolt. In event of a crash, damage is not likely to affect the engine. The most probable damage will be a broken propeller or bent mounting bolt. It is easy, and inexpensive, to replace the propeller mounting bolt on the new "*OK*" *.039*.

The integral fuel tank forms the back closure of the crank case and also serves as a sturdy engine mount. This tank is unique inasmuch as it has no outside protuberances with the exception of the filler and outlet tubes. All reinforcements are internally located. A further desirable design feature is the positioning of the outlet tube. As shown in the cutaway engine photograph, this tube enters the left side of the fuel tank slightly above the center and level with the needle valve tube, passing diagonally, and at a compound angle to the opposite side, slightly below center. This arrangement permits the use of every drop of fuel without any appreciable change in feeding fuel to engine for sports or pylon flying. This tank also has ample capacity for free flight, approximately two-thirds of the fuel being used in this event. Arrangement of this outlet tube was first introduced about six months ago in the die-cast tank for the "*OK*" *.049*.

The low price of the new "*OK*" *.039* may imply to some that this is an expendable engine. This is not true. You will get long hours of dependable flight service from it comparable to what you might expect from any engine of its size and class.



HOBBY COUNTER

Conducted by THE TRADE OBSERVER

THE grapevine has it that *DMECO* (deBolt Model Engineering Co., Williamsville, N.Y.) will be a firm to watch during 1951. This upstate New York outfit has been going all out on the development and testing of an entire new series of designs. If *DMECO* succeeds in getting all these new airplanes into production you can look forward to a one-a-month pace through 1951. When the mystery deepened, your Hobby Dealer popped the question to deBolt himself, "What goes on in Williamsville? How about a preview for MODEL AIRPLANE NEWS readers?" Gentlemen, here is the lowdown!

First of the new ships to break will be a trainer. Successive announcements will reveal a progressive series of ships ending with the most advanced types. The new series will be entirely separate from the deBolt designs now on the market. Whereas the old models were, for the most part, intended for the accomplished modeler, the new ones constitute deBolt's version of an integrated program to bring in a maximum of new modelers and to advance the skills of thousands of those who fail to follow up their early attempts; they are intended for the average modeler.

In one important respect, the deBolt program will remind you of the *McCoy-Testor* plan, in that all designs call for a specific size engine, but goes further by calling for the precise engine of any make that deBolt considers ideal for his airplanes.

"In this way," deBolt told your reporter, "we hope to be able to solve the problem of the beginner buying an off-breed Class B engine, for an example, and trying to install it in a 1/2A model; it's a problem that has been with the industry for a long time and one that has ruined many a beginner at the start."

* * *

Speaking of the trend to pinpoint a particular displacement and brand engine for a kit, Lou Andrews, famed stunt pilot and designer for the old firm of Paul K. Guillow, Wakefield, Mass., demonstrated for us his new *Trixter Fox 35*-powered *Barnstormer*. Señors, this is ze superb airplane! That goes for the kit, too. Flyable on .23 to .35's this ship spans 47" and has an area of 470 sq. in. Realism is unexcelled in stunt models; the plan is an education in itself; and all wood parts are nicely die-cut.

Don't be surprised if Guillow comes out with a 1/2A *Trixter*. The test ship is as cute as they come and did the full pattern with ease on 35′ lines. It was powered with Bill Atwood's amazing little *Wasp*, red plastic prop and all. According to Lou, practical stunting of 1/2A's on 35′ lines is possible now because of the new .008" flexible multi-strand lines, as marketed by that wizard of wire, Matty Sullivan (Sullivan Products, 214 W. Dauphin St., Philadelphia. Sullivan, by the way, has been holding back two sensational developments—toward ultimate simplification—due to the war situation.) The single strand .004" wires are comparatively hard to handle, and are easily kinked. One important feature of both the big and little *Barnstormer* is the rectangular tank developed by Andrews in preference to the wedge. This tank has only two openings, the fuel feed line and the filler vent. The model is held up on its side when filled and vents through the engine venturi. In plan view, the tank is longer on the outside-circle side.

* * *

Have you seen *Scientific's* (Scientific Model Airplane Co., 113 Monroe St., Newark 5, N.J.) *Half Pint* racer for only $2.95? What gets us is the engine installation; all they did was hook the fourth wheel to the engine and mount the powerplant beneath one of the rear corners of the body. Speaking of cars, some of our boys, and juniors too, had wonderful fun with those *Air Cars* by Top Flite Models, Inc. (2635-45 S. Wabash Ave., Chicago 16, Ill.) when powered by the *.02 Infant* swinging its aluminum prop. Judging by that riot we had in the kitchen, these *Scientific* race cars are going to be a tremendous hit.

Features include a brightly painted molded wood body, direct drive (and who would have thought you could do it without gears), rubber wheels with metal hubs, tank material, axle, die-cut ply, hardware, decals. Car is yellow with silver and black trim. What the ads don't tell you is that John D. Frisoli and his boys experimented with several different car models for six months prior to starting the production line. It's for .02's to .074's. With the latter—wow!

* * *

Calling all free flight fans! That *Champion 36*, 1/2A from Jerry Brofman's bench at *Enterprise* (Enterprise Model Aircraft & Supply Co., Inc., 5107 Avenue D, Brooklyn 3, N.Y.) is everything it was touted to be. Ours went like a dream. Nice, viceless model for some real sport flying. With this pleasant building experience under our belt, we asked Jerry if anything else was in the works. Maybe you have seen it in the ads by now, but *Enterprise* has a 1/2A control liner that looks good. It's called the *Knockout*, and features fully shaped round fuselage, twin cockpits, and the same fully hollowed and carved all-wood wing that made the *New Era* famous.

* * *

Johnny Zaic, of the Zaic brothers and sister, the crew behind Junior Aeronautical Supply Co. (203 E. 15th St., New York 3, N.Y.) reports *JASCO* is in the middle of a major change over. All the rubber models are being revised, which explains why current ads do not feature rubber, and, on all kits, printed sheets are being changed over to die-cut sheets. Original kit names will continue, but designs will be improved in actual design, construction, and performance. One big headache for the manufacturer is that model builders do not read directions—and that goes double for engines. Johnny says there is a behavior pattern in building; just build and fly as quickly as possible without reading directions or flying instructions. Ain't that the truth! Your Hobby Dealer's experience is that the only thing a modeler will read is the pictures or drawings. In fact, scads of kids can't build a model without an illustrated sequence of construction. Industry, take note!

* * *

Clever combination handle and reel by Thomas Products (105 N. Halifax Ave.,

Daytona Beach, Fla.) should end a lot of line troubles. Separate handle and reels have well known disadvantages but many modelers who prefer light handles don't take kindly to combination deals. The Thomas handle is made of red plastic and is both strong and light. The winding handle tucks out of the way but is instantly available for getting those lines off the ground at contests, or paying them quickly (30 seconds) when ready to fly. It's a nicely thought out handle; come in and look it over. Called *Tommy Handlereel.*

* * *

Sam Goldenberg of Airlane Model Co. (318 W. 29th Street, Chicago, Ill.), with a rep for cramming value into low price kits, has nine new numbers. Six retail at two bits (a 15" Luscombe, and 13" Bellanca *Cruisemaster, Ercoupe, Tempest,* Consolidated XP-81, Grumman *Bearcat*) and three at four bits (21" *Taylorcraft,* 15" *Little Stinker*—Betty Skelton's stunt biplane, 21" *Luscombe*). Prefabbed, balsa parts notch cut, colored plastic prop among features. They rise off ground and fly under their own power, sez Sam proudly.

* * *

Good investment: Ohlsson & Rice Inc. (Emery at Grande Vista, Los Angeles 6, Calif.) have their 1951 catalogue available for 15¢. Contains a lot of valuable info and some good hints, such as model classifications, construction of control lines for safe flying, aerobatic regulations, propeller sizes for each engine. But what gets us is the wide diversification of O & R products which include the .29 race car engine, the .29 marine engine, timer assemblies, two-speed timer, modernization units for old engines, fuel tank-mounts, flywheels, fuel proofers, and a really wide variety of fuels. There are nine variations of O & R glow plugs, various booster attachments, like the snap-on clip. Then there's the *Midget Offie* car and accessories: thrust bearings, universal couplings, and the like.

* * *

Over in the paint department, Testor Chemical (Rockford, Ill.) has hot fuel proof finish *(STA)* in 15¢ size bottles, and in seven additional colors. Testor states *STA* is not affected by high concentrations of such ingredients as nitro-methane, nitro-propane, castor oil, methanol.

* * *

Mod-Ad Agency (156 W. 22 St., New York, N.Y.) has a new dealer's bulletin with a complete listing of all engine parts. Mod-Ad stocks practically every part for most engines at all times. Since about 60 "name" engines—and variations thereof—are now in production, this is an achievement of no mean proportions.

* * *

A 4' dia. flying saucer that soars in the wind to heights in excess of 1,000' and which may be seen for miles is being marketed by Atomcraft Products Co. (411 Broadway, St. Paul 1, Minn.) of balsa and reed construction, covered with durable aluminum foil, the *Flying Silversaucer* requires but a moderate wind for flight. An intake vent admits the breeze and a fin behind the vent splits the air flow to create vacuum lift. An additional kit will permit illumination for night flying. Price is $4.65.

* * *

A 1½" scale model—25½" span—of Betty Skelton's Pitts Special is to be marketed by Berkeley Models (142 Greenpoint Ave., Brooklyn 22, N. Y.) at $4.95. More advanced in prefabrication than previous kits by this manufacturer, kit will have elaborate decals of fuselage checkerboard and sunburst wing design, stamped metel cowl including air intakes. Drip pan and pants will be drawn from metal. Other new Berkeley items: ⅝" scale model of 19' Chris-Craft *Riviera Runabout* in die-cut mahogany veneer to sell for $2.95; *Jetex 50* powered *Sea-Jet,* capable of 400' per cartridge, to sell at $1.95 including jet engine; controline all-metal handle and reel, with snap-on controls and wire. For ½A with 35' lines at $1.65, and for Class A with 50' lines, at $1.95.

El Gizmoe

(*Continued from page* 11)

In starting construction it is best to draw up full size outlines of the various component parts. These drawings need not be as detailed as the plans shown herein, since constant reference to the magazine is readily available. When constructing the model over these sketches, it is advisable to cover them with wax paper to prevent the cement from adhering to the plans.

For the sides of the fuselage, be careful in selecting the wood; it should be medium soft balsa and have a definite quarter grain. The two sides are cut to the exact shape shown and the 1/16" x 1/8" crosspieces cemented in place. When these are dry, the two sides are joined using the same size and length joiners as you used for the corresponding crosspieces. Note that these pieces are placed directly behind those cemented on the two sides. Hard 1/16" sheet is cemented crossgrained on the fuselage inside, at both the front and on the dividing section, for much-needed strength. The other two sides are now added using plenty of pins and rubber bands to hold them securely until dry. They can then be trimmed and sanded smoothly; round the edges slightly. Add the aluminum hinges and the 1/16" hinge pin, then make the cut for the folding section.

The wing mount is now built, cutting the 1/8" sheet saddle to shape and cementing the two sides together to fit the fuselage. The 1/4" pylon is shaped to the bottom of the wing and is cut off with 3/16" incidence built in. The bottom of this pylon is notched to fit the saddle and securely cemented in place. It is best to apply at least four coats of glue to this joint, for it is highly stressed. The wing platform is made from very hard 1/8" balsa, as is the tail platform. Follow the same procedure in cementing these platforms in place as on the pylon. It is vitally important when installing these platforms that the correct incidence be built in, since the proper trim depends on their accuracy. The wing has 3/16" while the tail has no incidence, so take care.

Since the construction of the wing and the tail are identical, we will go into the details of the wing and let you, the builder, apply the same methods to the horizontal tail. It is best when starting construction to make metal templates of both airfoils; these may be cut from scrap aluminum or tin cans. They should be trimmed and filed accurately to shape.

Cut the necessary ribs from medium soft balsa, pin together and sand smoothly. The leading and trailing edges are cut to taper. If you do not have the correct thickness of wood for the leading edge, it can be laminated from multiple pieces of wood, as was done on the original. The 1/16" cutouts are made in these pieces to receive the ribs. The spars are pinned in place on the sketch using scraps of balsa to support them at the correct angle. The ribs are then cut to proper length and cemented in place; remember always to cut the excess from the *trailing edge*. When dry, the dihedral is added at the poly break so that both sides can be included at the same time. Following this the center cut is made and dihedral added. The leading edges are now shaped and sanded smooth. The tips are small 1/4" scraps cemented in place and trimmed as shown. The center section of the wing is covered with 1/32" sheet, sanded smooth, and the wing is then ready to cover.

Construct the horizontal tail in a like manner, omitting the sheet covering in the center section but including the gussets for strength.

The vertical tail is of simple warp-free construction, built flat and sanded to the correct contour. The tab is not added until after the rudder is covered.

With all this work finished, the nose assembly is made by laminating 1/4" sheet for added strength. The prop block is cut to shape from fairly light wood for ease in carving and lightness; the block is then carved using a very sharp knife, shaping the rear or undercambered side first. The camber should be 3/16" deep about halfway out on the blades, taking care that the entire camber is faired smoothly over the entire blade. When this has been sanded smooth, carve the upper side roughly and shape the blade keeping a lot of the area near the tip. This side can then be carved until the thickness is approximately 1/8", two thirds of the way out. Using successively finer grades of sandpaper, go over the entire prop until it is very smooth. The hinge is 1/8" dural drilled at an angle to allow the blades to fold flat. The center is drilled with a 1/16" drill for the prop shaft. The hinge pins are bent from .049" music wire to fit the blades snugly. These are wrapped with surgical gauze and cemented in place along with the hinge. You will find this gauze very handy when need arises for some real strength. Several coats of cement are added to all these joints.

The original model was covered with red and yellow Jap tissue, the right panel being yellow on the wing and the left panel red; cover the tail vice versa. The fuselage and rudder are covered with yellow tissue. After water-doping, four coats of dyed dope are brushed on all covered parts. The prop, nose block and wing mount are coated with at least six coats of yellow-dyed dope, sanding smooth between each coat.

Since the tail pops up and is removable, it must be keyed in position. In this case the keys are pins bent in a loop, inserted in place; then the ends are bent over and cemented to the leading and trailing edges. The wire fittings can now be bent to shape and installed; these include tail hooks, fuse hooks, dethermalizer hooks, pylon hooks, saddle hooks and prop shaft. A *Jasco* removable bobbin is used on the prop shaft. At this time install the sheet celluloid reinforcement for the rear dowel; when dry make the cut out in the fuselage a tight fit. Bend the winding hook from 1/16" music wire.

The motor used was 16 strands of 1/4" *Dunlop* rubber. The motor is measured by allowing for eight strands 84" long. This is lubed, then wound backwards approximately 90 turns. When doubled for the necessary 16 strands, the motor will entwine on itself giving a pre-tensioned motor. The motor should be prewound before installing in the ship. The wood screw used as a stop can now be installed in the proper position to allow the blades to fold flat.

After all this work, your model is ready for test flights. Assemble the model and try the first glide. Launch into the wind with a slight push, noting any tendency the plane may have to circle. Move the tab in the direction the model wants to go and position the wing by moving back or forward as may be indicated by a stall or steep glide, until you obtain a nice flat glide. It does not matter which direction the model turns, since the power flight is controlled entirely by thrust adjustments. After the correct glide has been obtained, power flights are attempted by hand-winding about 100 turns. Note the attitude of the ship, adding down-thrust and right-thrust until a flight to the right under power is obtained. Keep adding turns and making power adjustments until about 200 winds have been hand wound in the motor. When this point is reached, try 300 winder turns; if the flight is good, put in 400 turns, adding thrust adjustments as needed. Under no condition while going through this power testing is it advisable to change the incidence or glide since it is very easy to get maximum length flights by merely changing thrust adjustments. On the winning flights at the Nats there were about 775 turns put in the motor for each flight. It is not necessary to put the absolute maximum turns in the model for out-of-sight flights. Just take plenty of time to make the necessary adjustments and a very good contest model will result. Good luck!

PHOTO CREDITS

Page
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19 All Douglas Aircraft
34 All Paul Gilliam

Scrap Box

(*Continued from page 2*)

picking up the crumbs. Because of sectional differences, such groups would never unite, and it is probable that some commercial interest would eventually dominate organized modeling in any way they saw fit.

If the Coast really has national interest in mind, it should postpone drastic measures until after the next Nationals. If AMA headquarters and the NAA really has the modeler's interest in mind they should meet half-way with representatives of dissident groups at a full-fledged Executive Council meeting at the Nationals, and reach some concrete conclusions. Then if, by set deadlines, prescribed action has not been taken, let our conscience and common sense decide what to do. The adoption of the proposed Constitution is much the lesser of two evils. Let the Coast demand action on that constitution—or else. Let's have done with it!

* *

It has been proposed in England that an Annual Model Aeronautical Olympics be established, with representatives of F.A.I. member countries competing. The purpose is to help member nations form an idea of their commitments and to budget accordingly. With the exception of our half-baked Wakefield efforts, the U.S. is isolationist; there are many international events hotly fought over that our modelers have not even heard of. Anyhow, the meeting would last seven days, four for contest flying, with days of rest and repair in between. Ain't that something! The F.A.I. would, it is hoped, make an annual contribution toward the total cost of the meeting. Four suggested international contests would include rubber (Wakefield Trophy), gliders (Swedish Cup), Power, and Radio Control. If control line is in demand, these events could be arranged on the days of rest. Stunt flying in a wind is hardly rest, anyway you look at it, but you get the idea. National teams of twenty—we can't even get six fliers across the Atlantic for the Wakefield!—to be broken down as follows: Wakefield, 6; Glider, 6; Power, 6; radio control, 2. Or, if control line is included, it would be this way: Wakefield, 6; Glider, 4; Power, 4; Radio, 2; Stunt, 2; Speed, 2. A world's championship trophy would be awarded to the nation piling up the most points, said points to be on a progressive ratio system, whatever that is.

The basis for this startling idea is that many of the other countries compete in various international events and it is felt it would be more economical to send 20 team members to one event, than four team members to four different events in scattered countries. One thing is evident: those European boys love their Wakefield models. Interest in control line is dropping off abroad, which explains their apathy toward yo-yo.

We have a counter suggestion. Let's modernize the Wakefield. Convert it to gas. (Screams of anguish!) But it makes all the sense in the world. When Lord Wakefield sponsored this thing it must have been in his mind to foster maximum interest, and it has been proved adequately that the 200 sq. in., rubber-job, with its strict limitations on tail area, weight, and launching method, is about as useful as the sidewheel steamer. Speaking personally, the Wakefield model is a challenge, a release for inhibitions, and a thing of great satisfaction, while in one piece. That's the trouble. The old men love it. They defend it to the death. The typical Wakefield team averages almost double the junior event age.

Now suppose the new *modern* Wakefield were limited to engines of, say, .049 maximum displacement. Keep the area at 200 sq. in. That's fairly big for such engines and would tend to put some emphasis on design. Such a model would weigh at least 5 oz. if sensibly built. Perhaps the old 8 oz. gross weight rule could be carried over. For international competition, takeoff could be required, but none of that

(*Turn to page 42*)

Beginners... Now you can afford a GAS ENGINE!

New OK CUB .039

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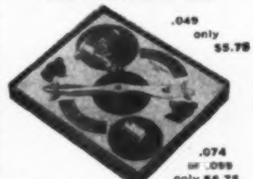

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wing tip and prop stuff (ouch, my finger). Overly assisted take-offs gum up more flights than they help. Limit the stab to 50%. *There* is a model we all could fly, and it wouldn't be a complete push-over because cleanness of design would pay off. There would be more luck—but it would not be entirely luck. A good Wakefield model is now far over the heads of the kids in any land—as is evidenced by how that Finnish chap has moidered the opposition two years running. At present there is not a super-Wakefield model in this country, and we doubt there are more than six in the whole world.

This brings us back to the present Wakefield set-up in the U.S.A. If the eliminations cannot be run fairly, with many modelers not knowing the details until too late, let's put it back on the old Nationals basis. Regardless of how the team is picked for 1951, the 1952 team, with alternates, could be chosen at the 1951 Nationals. It would be sound thinking to permit any members who placed in the actual finals the year before, to remain on the team automatically. This event is one of national prestige and we should pick teams to win, not to give everyone a ride on the merry-go-round.

Ed Breland, chief announcer of station WAML, Laurel, Mississippi, thinks we should say something about possible shortages of materials due to the international situation. We just as leave would solve the international situation itself, the one being as easy as the other, but if you'll promise not to look up this column a year from now, here is a faint peep to add to the racket.

Material shortages were discussed by many manufacturers we talked to at the Nationals. At the time everyone was hogging all the sugar and tires in sight. It was probable that material shortages were then in the imaginary state but that was enough to make manufacturers hold off on some clever devices then in sample form.

It would seem only common sense to assume that military production is going to have its effects on civilian economy. Various trades on whom we depend will have their people increasingly tied up with other jobs, but it is probable that the situation won't be so tight in the very near future that our own people can't manage somehow. Perhaps things will take longer to accomplish but there seems little reason to expect a tight supply comparable to that of a real wartime basis until the government turns to material and manpower controls. Can't say that our every day comfort has been disturbed in any way as yet, and that includes models. Things do cost more. Engine prices are changing. Let's hope the world situation doesn't get worse. Meanwhile, we refuse to do any more stewing. Where's the next Nationals to be held? Philly, did you say?

You know, the last Nationals clearly proved that the big meet really is a super local contest, with the ranks swelled by entrants from nearby states. In 1950 the local guys were mostly free flighters so the breakdown on events did not reflect the national picture. A dealer pointed out to us that many control-line fans came with free flight models, knowing they didn't stand a chance in control. With these demonstrated facts in mind, quite a few of the wheels were in favor of placing the Nationals where they would do most good for the activity. For instance, a California Nationals would boost Coast modeling. And a Philly Nationals would procure a thousand entrants who might not be willing to cross the Mississipp—or the Hudson. Why not locate it on the West Coast one year, then the East the next year, and back to the "wind-belt" for the third. Or vice versa. One thing is for sure: the boys are tired of the Midwest. And, being a super local meet, the Nationals have been in the middle of the country long enough. Anyone who doesn't want to go from California to the East, or from the East to California, could wait for the second year. Too many of both do not go to the Middle West, the only reason why the big contest is held there to begin with.

Charles Haas, Chicago, took the Jim Walker Stupidity Award for setting off a smoke bomb in his room at the Nationals, so that no one got an hour's sleep all night. Behind the Stupidity Award is a more serious purpose, that of eliminating accidents before they occur. For instance, if some guy knows he may take the award by holding the handle upside down, he'll be more careful before taking off. The idea is to spy on the other guy and report his boners. There will be a $100 prize for the modeler sending in boners amounting to the most points. Taking off with handle upside down might be worth 50 points; for not looking, and hitting a dog you'd get 100 points, boy on bicycle 150 points, spectator 200 (each additional person another 50); starting a loop with empty tank is good for 50 points, and so on down to hitting high-tension lines and being shocked, 500 or 1,000 points and the jackpot if you electrocute yourself.

This could be fun. But we'll have to wait until Jim has a full list of boners with comparative values. Like taking off with lines not attached, or picking up the handle to another ship. All this is only a preview; wait for the big announcement!

Here's one boner reported by Fritz Clark, Rolla, Mo. A prospective modeler in Rolla bought a new engine equipped with an ignition system. After running it a few times he decided it would go better on a glow plug. So he installed the glow plug, hooked up all the wires and ignition parts again, and attached the boosters. The engine refused to run. Then he examined the plug and it was burned-out. Next he checked the boosters—only 1½ V. Couldn't be! When last seen he was still staring at the engine. Well, Fritz, it is too soon to earn anything in the proposed Stupidity Contest but we'll award you the monthly free subscription to MODEL AIRPLANE NEWS for the best tall-but-true story of the month. Now about this international situation . . .

Report from the West

(*Continued from page* 8)

the .020 engines. These smart little jobs are out in kit form and are manufactured at Your Hobby Shop in Pasadena, California. Glad to have you and the family with us, Ken.

We ran into Lud Kading, the "K" of the *K & B engines*, the other day. Lud was testing a couple of his 1/2A jobs (testing is a slight understatement). The two small ships he had were called his "Fun Models" and were strictly for sport flying. (Rather hot for sport flying aren't they?) We saw a couple of O.S.S. flights very nearly straight up and know that these ships have turned in many 10 and 15 min. flights. They are small but mighty. We enjoy seeing the manufacturers, such as Lud and many others, taking an active interest in model activities and helping youngsters over some of the rough spots.

Russ Johnson of San Gabriel gave us the "scoop" on his new outdoor stick model. Seems Russ had a Wakefield model that was giving him a bit of trouble until he bashed in the wing tips a bit. Being a resourceful young man, he proceeded to completely eliminate the tips and do a slight bit of modifying here and there; results—a mighty sharp stick job that turns in top performances. Russ uses 22 strands of 3/16" flat rubber and has changed the 17" free wheeler to a folder.

"Zip" Grandel pulled his speed job out of the mothballs (or we should say his flying handle) and hung the lines on one of the slickest class D jobs that we have seen in some time. This ship is powered with the famous *Dooling 61* and gets away like the proverbial scared rabbit. "Zip" had a bit of trouble on his flight and bounced in on the first lap. We are looking forward to big things when the "old maestro" gets back in the groove. All of the top speed boys know and respect Grandel's efforts in the speed circles; here's another of the old timers that we're glad to see back. It was some time ago that "Zip" was a flat-track race

car driver and had nine years at the wheel. He tells us that his comeback in the speed circles gave him more "butterflies" than any of his experiences behind the wheel.

We understand that some new-fangled contraption called television has undermined the model building of two well known team race fans. Orm Sutter and Les McBrayer have had pretty clean work shops the last few months. What gives, fellows?

Keith Storey has been at the drawing board again and has whipped out a slick new team racer that should give his competitors something to think about. His famous *Key* has left many hopefuls at the post so to speak, and we are wondering if he can turn better times with his new "dream" job. It should be an interesting comparison when these two ships vie for top honors in future team speed events. The new one is going to have to be terrific to better the records his *Key* has set.

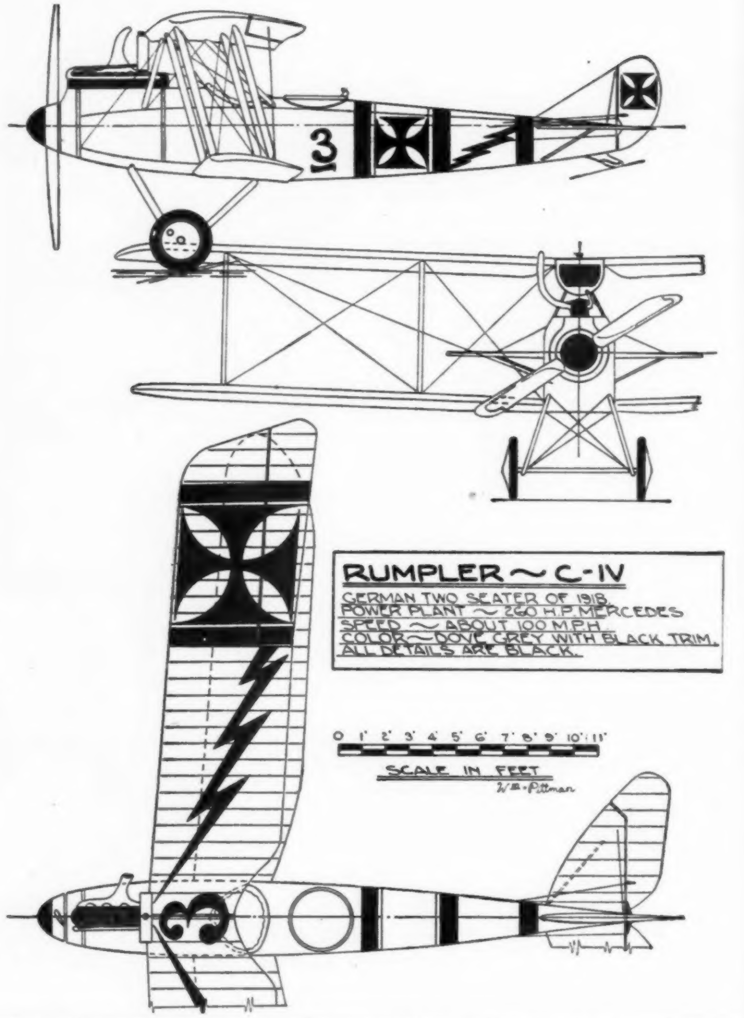
Don "Jet Job" Ayres gave us a sneak preview of his newest original *Dynajet*-powered speedster. This ship weighs in just under the 2 lb. marker and believe it or not, it has no fuel trouble. We watched Don on one of his first test flights with this new ship and were amazed at the stability, speed, and smooth fuel feed system. Don lives in West Los Angeles and has been doing much work with the jet speed jobs. We would like to go on record as saying that this lad will be one of the top jet men in the country in the near future.

Southern California has gained another "hot pilot" in Darrel Dolgner. Darrel hails from Washington, D.C., and is now living in Los Angeles while attending school. We were watching this lad's new class A *McCoy* job turning past the 120 mph marker when a wing decided to give up. A very revolting development, and an untimely end for a very fast ship. We know there will be more heard from this new arrival, so keep your eye on him at future contests.

Another of the old timers has decided to re-activate some of his models. We are pointing our finger at our good friend J. C. "Madman" Yates. We learned that J. C. is up to his ears in the prop business but has decided to get his feet a bit wet again with his famous stunt model, the *Madman*. *Y & O* props are now being manufactured at a new location over on Redondo Beach Blvd., and Yates has cleared a circle out behind the building and has been doing some practicing. Looks like it won't be long before some new hardware will be decorating the Yates' household.

It seems like the "bug" has bitten lots of the old timers of late. Jim McElroy from over Phoenix way dropped in at Los Angeles and carted away the 1st place trophy in D speed at the recent All Western Opens. Jim informs us that the *Phoenix Model Club* is planning a big *A.M.A.* meet at that fair city in February of '51. Two classes of speed will be on the agenda with the possibility of 1/2A for a third class. Three classes of free-flight will be featured, and possibly more events will be added later. Quentin Webster of Webster's Hobby Shop will C.D. this combined free-flight and U-control meet. The final dope on this coming meet will be out soon. Jim McElroy is sharpening up his speed job and is really going all out to break the 160 mph marker—this is straight from the "feed bag." George Mueller, also from Phoenix and President of the Phoenix Club, informs us that their roster carries 35 very active members, and they'll be on hand to try to keep the trophies home. We'll all be over, fellows.

We were nosing around Culver City on one of our jaunts and happened in on a bit of flying that was taking place at Hughes Aircraft parking lot. It seems that the *Sky King Model Club* of that city had postponed their contest that was to be held a few months previous, but some of the enthusiasts showed up just to fly. In the near future there is a possibility that the *Sky Kings* and the *Santa Ana Thunderbugs* will consolidate their forces to put on one of the largest and best meets of the year. It has been our pleasure to enter a few of the contests sponsored by these clubs, and they have always been tops. Frank Harrington is doing much of the groundwork to bring this flying session into being.



Jack McMullen was working out an original *Fox 59* powered stunt job and doing a very nice job. The engine was really perking. It's no wonder, as the old rpm maker himself was on hand; as we live and breathe. Duke "Hot Pilot" Fox was out there helping the lads with their engines. It didn't matter what brand was being flown. Duke was right in there helping out whenever assistance was needed. Your reporter was kidding the engine maker a bit about taking a handle in his hand. Our eyes were opened a good bit when Duke pulled an inverted take-off and proceeded to go through the pattern with a good deal of nonchalance. We might add that the flight was of contest proportions and would have piled up a high number of points. We were invited over to the Fox Engineering Company for a "look see" and had a first hand demonstration of the now famous *Fox* engines in action. Believe us, those little power plants really put out. If you don't believe us, ask the man who owns one.

We received some good information from our northern friends, Mom and Pop Robbers. At one of the recent meetings of the *Western Associated Modelers*, a very vital point was brought up. It pertained to judges of the stunt and other events. Judges are very often procured by making a general appeal, at many of the meets. The people who respond deserve much credit as judging is usually a thankless job and much hard work is connected with it. The main "bone of contention" seems to lie in the stunt event. If we may quote *W.A.M.* as follows: "Further, that a personal request be made to the individuals needed for key positions well in advance of the contest rather than making a general appeal at the contest. This recommendation for contest procedure was approved. It was pointed out that contest directors should make every possible effort to secure stunt judges who would work for the full duration of the contest. This would result in more standardized judging." All this was approved by the following clubs: *Aero Modelers of Alameda, Martinez Aero Modelers, Pittsburg Cloud Busters, San Leandro Line Twisters*, and the *Sky Rogues*. The precision event is definitely the toughest part of any U-control contest to judge. Capable flyers who can make quick definite decisions should be at the tables when the precision event is run off. It must be realized that there is sometimes a very fine line between a good maneuver and a bad one, and it takes a good judge to spot it the instant it happens. However, we are casting no reflections on the judges of any contests as they deserve a lot of credit for sitting out a full day at the judging table.

It looks like the towline gliders are getting larger and larger. We have seen several ships entered in contests with more than 10' wingspans. Louis R. Culler of Torrance, California, had one of the most beautiful ships in the air. The model was an 11' modified *Thermic* and weighed in at 5 lb. 14 oz. We watched this ship make several flights, and they were all very good. Louis is a member of the *Inglewood Flight Masters* and goes in for "big ships in a big way." This one looked like a natural for a radio unit.

See you here next month.

TESTING ELECTRIC CIRCUITS

by RAY RUSHER

A TYPE of electrical testing instrument that is very handy to modelers is a *Multi-tester*, having a milliammeter that can be used to measure voltage, amperage or ohms by plugging the test leads into different jacks on the panel of the instrument, and setting the selector switch at the proper position.

Multi-testers cost from about $10 up and will be found well worth the price to modelers who want to investigate ignition circuits for model engines and do other electrical testing. For instance, the voltage and amperage of flashlight cells can be determined, the resistance of the primary and secondary coils of a spark coil can be measured, the resistance across the ignition points and thereby their condition can be determined, the resistance of wire in an ignition circuit can be measured, the condition of the condenser can be checked, leakage across the electrodes of a fouled sparkplug can be checked, etc.

In connection with model engine ignition circuits, the tests desired are: (1) voltage available from the current source; (2) voltage across the circuit when the spark coil is energized; and (3) amperage flow through the circuit when the spark coil is energized. To do this conveniently, a special switch can be made to cut in the ignition circuit and connect with three jacks of the *Multi-tester*. The switch is shown in Drawing 1 mounted beneath a panel. Drawing 2 shows the front of the panel together with plug-in connections to the appropriate jacks of the *Multi-tester*, the source of current supply, the spark coil and the engine. The above three tests are conducted as follows:

(1) Press voltage button while timer contacts are open.

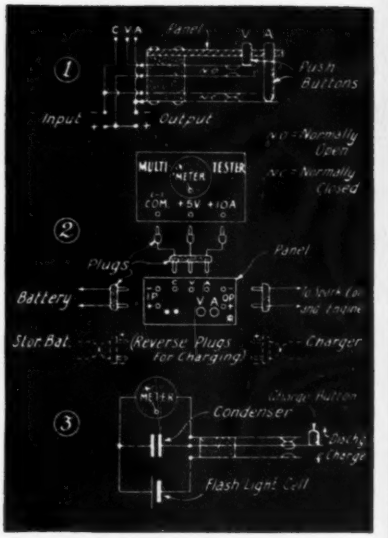
(2) Press voltage button while timer contacts are closed.

(3) Press amperage button while timer contacts are closed.

The switch is thus readily operable to check voltage and amperage without the bother of changing the position of the test leads relative to the jacks of the *Multi-tester*. It is unnecessary to make contact of the test prods with the different wires or terminals each time a reading is desired. The switch is particularly convenient when making a series of tests such as those to determine the required wattage for starting an engine and the minimum wattage required to keep it running. The switch also prevents current from flowing through the instrument except when test readings are to be made. Amperage tests on flashlight cells of less than 10 amps. can be made directly on the *Multi-tester* (provided it covers this current range) by plugging the test leads into the "common" and "+10A" jacks.

The described switch can be used to make either of any two tests, provided these tests can be made with the same selector switch setting, and one circuit calls for normally open contacts and the other for normally closed contacts. It can also be enlarged with further contacts and leads to the *Multi-tester* for making voltage and amperage tests in other ranges. A little study will show the principles involved so that various switching arrangements can be made to facilitate performing many different tests.

The switch disclosed is also usable in connection with the charging of a storage battery to check the charging rate (amperage). The amperage button is used in the same way, but the plugs to the input and output jacks of the panel must be reversed as shown dotted in Drawing 2 for proper polarity through the meter. For checking voltage, however, the leads are *not* reversed. Voltage readings during charge indicate the voltage being supplied from the charger to the battery. Battery voltage can be checked by removing the output plug, and charger voltage can be checked by removing the input plug.



To test condensers, hook up a single-pole-double-throw switch as in Drawing 3, with a flashlight cell and the *Multi-tester*. When the position of the switch is reversed from that shown by depressing the "charge" button the condenser will receive a charge from the cell. When the button is released, the condenser will discharge through the meter, causing the needle to swing and return to zero if the condenser is in good condition so that it will take a charge. In this test use the 1 milliampere jack of the *Multi-tester*, as the discharge from a condenser of the size used for model engines is less than that value during the fractional part of a second that the discharge takes place. The swing of the needle will vary depending on capacity of the condenser and voltage of the cell. Test unknown condensers against one you know is good, and you'll soon know what readings to expect.

Multi-testers are provided with very sensitive meters. They measure the current that passes from a flashlight cell through the body from one hand to the other. This amount is less than 1/10,000 of the current that a spark coil takes. They can, therefore, be used to detect the slightest electrical leakage such as that which flows through oil soaked insulation on ignition wires or between terminals mounted on wood, or balsa that has become oil soaked. They are accordingly of much value for checking ignition systems to detect and remedy such leaks. *Multi-testers* are available at most radio stores which deal in transmitters and parts for home building of sets in addition to the regular business of selling receiving sets.

90 M.P.H. With Rubber

(*Continued from page 25*)

few curves, and mark the position of the crossbraces.

The fuselage is constructed in the conventional manner, by laying down the two sides on the plan, and then joining them together with the aid of the top view. Use the hardest balsa obtainable, both for the longerons and crossbraces. This is necessary in order to absorb the torsion of the powerful rubber motor, and the shock loads imposed on the model in rough landings. Upon completion of the basic fuselage framework, add the sheet balsa fill-ins.

The landing gear is then bent to the shape shown on the plans and cemented between two layers of 1/16" plywood. When dry, this assembly is bound to the basic fuselage framework and cemented in place.

To begin construction of the wing, cut the leading edge strip and sheet balsa to the required length. Cement them together on a flat surface for perfect alignment. The

procedure used for shaping the wing is very much the same as that used on hand launched gliders. The tips are first shaped and sanded smooth. Then mark the highest point of the camber with a thin line, which in the case of this low-drag section is 1-1/2" from the leading edge of the wing. Having done this, shape the wing with a razor sharp knife until the approximate airfoil shape is obtained. A little sandpaper will do the rest.

For construction of the stabilizer and twin rudders, follow the same procedure as previously outlined for the wing. After they are cut to shape, cement the rudders to the stabilizer.

The propeller is carved from a block of soft pine or basswood, the dimensions being 6-1/4" long x 3/4" wide x 11/16" high. The blades are actually only 9/16" wide as the drawing shows; the extra width comes at the hub. Since space does not permit elaborating on propeller carving, this brief outline will suffice for those who possess even a scanty knowledge of propellers. First, begin to cut out the propeller blank using the top view dimensions only. After this is done, follow the same procedure for the side view, thus completing the blank. Using the airfoil shape marked off on the end of the block, carve the propeller until the approximate shape is obtained throughout both blades, the area closest to the hub being made proportionately thicker to absorb the strain on the blades while rotating. Sand the propeller to finished shape, and check to make certain that it balances perfectly. If you would rather not spend the time carving a propeller, your local hobby dealer might be able to supply you with a hardwood or plastic propeller that would fill the bill.

The nose and tail blocks are carved from hard balsa. If you prefer to laminate them, then medium balsa will suffice. On this particular model, the winding is done from the rear, thus preserving the clean lines on the propeller.

To simplify the covering process, cover the two sides before cementing the wing and tail surfaces in position. Complete the fuselage covering and water shrink it.

The entire model was given three coats of thinned clear dope, sanding between each coat with very fine sandpaper. To propeller and rear winding assemblies, three further coats of red dope were applied, with a light rubdown after the last coat has thoroughly dried. The numbers can be masked off and painted on, or approximate size and shape decals can be purchased at the local hobby shop.

A center post will be needed to fly the model. The original was a piece of 1/2" diameter dowel two feet in length, to which the rotating hook assembly was fastened. The entire center post assembly took less than an hour's work to complete.

A steel line was first used, but kinks and other troubles made more trouble than it was worth, so it was discarded in favor of silk thread. Twenty and twenty-five feet of line were used for the original model; more than twenty-five feet is not recommended. If space is limited, cut the lines to fifteen feet.

If a little caution is exercised, adjusting the model should prove a simple matter. Put in about a hundred winds for the first flight. This should be just enough to taxi the model and take-off momentarily. If the model hugs the ground, it is probably nose heavy. If it rises too sharply, it is tail heavy. Adjustments can be made in two ways. First, by warping the stabilizer up or down—or else by adjusting the motor length to shift the center of gravity position. After each succeeding flight, keep adding more winds until the model is really buzzing. We've done 93 mph to date; perhaps you can crawl past the 100 mph mark. At any rate it's worth a try!

Laird Biplane

(*Continued from page* 31)

outer wing struts and allow to dry completely. The center section struts are small slivers of bamboo forced into the fuselage and through the upper wing.

Fasten a small sheet of 1/16" thick cork to the front of the firewall to act as the engine mount. This can be cut from a large bottle stopper if necessary. With a cork mount there is enough friction to hold the three pins that mold the engine without cementing them. The engine may now be installed with three small straight pins. Note that the engine is inverted. Slip the tank into the fuselage over the bottom wing.

The propeller shown in the plans has been used with great success on this model. The model's light weight allows the use of such a high pitch prop and thus a longer engine run. If you don't feel up to carving your own propeller or if your model is slightly on the heavy side, you may use the commercial prop that is available for the *Campus*.

Use 1" diameter balsa wheels on the model. A drop of cement at the end of the axle will retain them in place. The tail-skid is merely a small sliver of bamboo forced in place.

You may test glide the model indoors or out. Shift the tank forward or back to obtain the best gliding angle. When the best tank position is found, wedge the tank in place with a sliver or two of balsa, rather than cement it in place.

If you only derive one half the fun from your Laird that the author has had, you will have still made a very good investment in the model hobby.

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(Title 39, United States Code, Section 233)

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JAY P. CLEVELAND, Publisher.

Sworn to and subscribed before me this 14th day of September, 1950.

LILLIAN SCHWARTZ, Notary Public.
[SEAL] (My commission expires March 30th, 1952.)

Design Forum

(Continued from page 14)

be greater. There is always a balance between thrust and velocity with any given power.

This makes one thing obvious. If a plane of a given weight has small wing area, it will fly fast. If the wing area is increased without increasing the weight or, in other words, if the wing loading is reduced, the plane will fly more slowly. Therefore, for any given power and appropriate propeller, the propeller thrust of the slow flying plane will be greater than that of the fast plane. This fact is the basis for indoor *duration* flying. Here long flights are achieved by very light wing loading, with resulting slow flight and large slow-turning propellers. In this way power is converted into length of flight rather than speed of flight. Here we have the key to a very interesting experimental sport plane.

Supposing we take as a basis, the sport model we have shown in past issues. The general dimensions of this model are 21" span, 3" chord, 18" motor stick, 8" propeller, with four strands of 1/8" flat rubber used for a motor. In order to slow down this model so that duration will be increased and its reactions may be studied more readily, let us increase the wing area. The most convenient way is to raise the span, keeping the chord the same. So in our new slow speed plane, suppose we increase the span by 3/8; this will give us a span of about 29" and a total wing area of about 83 sq. in., instead of 60 sq. in. as in our basic sport plane.

Now the problem arises, how big shall the propeller be? It is a basic rule, which was established years ago, that propeller blade areas must be proportional to the wing area for proper flight characteristics in rubber powered planes. If the blade area is made proportionately smaller, we have a condition wherein this smaller blade area must overcome the same drag as the larger blade area; this may be done only by an increase in the blade angle of attack during flight, and usually this results in inefficient propeller operation. Equal propeller efficiency in all cases will be obtained by keeping the relation between wing area and propeller blade area the same provided all other factors are equivalent.

So instead of 8" as in the basic model, the propeller for our slower test plane will be 3/8 larger or 11" in diameter. Of course, the blade width must be the same, in order to insure that the blade area is 3/8 larger. Incidentally with this propeller the pitch will be 3/8 higher than that of the 8" propeller. Consequently it will turn more slowly with any given power and therefore duration will be greater. Because of this greater pitch the plane will travel farther in one propeller revolution as well as more slowly; thus more power will be absorbed per revolution, the drag in both planes being the same. For this reason, the required torque will be greater, so more strands will be needed in the motor—approximately one more strand, or five strands, will be sufficient. Although fewer turns may be stored in a five strand motor, the propeller will turn much more slowly compared to the decrease in the number of turns. A maximum of about 300 turns can be stored in a motor 1' long, composed of four strands of 1/8" flat T-56 brown rubber (hand wound). In a similar five-strand motor, approximately 270 turns may be stored. The duration of any plane is approximately proportional to the amount of rubber used so this larger plane should fly for at least 25% greater distance. The speed of flight will be about 20% slower.

Fig. 1 shows the general proportions and measurements of such a plane. The propeller should be cut from a block 11" long, 1 1/2" wide, and 3/4" deep. To cut the propeller, first draw diagonals from one corner to another. These will be the guiding lines for cutting (see line AB in Fig. 1) and will be the blade trailing edges; line CD will be the leading edges. Cut the propeller faces with these two lines as guides, then round the blade tips, finishing your propeller in the customary manner. These operations have been described in previous Design Forum articles.

You will note that the stabilizer is quite large. In order to have longitudinal stability, the stabilizer area must be proportional to the wing area. In this type of model it should not be less than 1/3 the wing area. A stabilizer area of 35% of the wing area will give proper longitudinal stability. In the plans, Fig. 1, dimensions are given which provide this area.

In the basic model the frame stick was 1/4" square. We suggest that you make the frame stick 5/16" deep and 1/4" wide in this new model with the more powerful motor. If you have built the original 21" span model from plans given previously, you may use the old motor stick, and cement a strip of balsa 1/16" thick to the underside of the original frame stick. This will provide sufficient strength for the 5 strand motor.

The old fin and stabilizer may be detached and the new larger surfaces added. Like the stabilizer, the fin of the slower model is increased in proportion to the wing area. The measurements on the drawing provide for this increase; the fin is approximately 12% of the wing area. Never should it be less than 10%; usually this is the minimum area and in some cases, causes the model to be critical in directional stability. If the fin is too large the model will turn sharply to the left. If too small it may turn to the right and fly erratically, with the tail swinging from side to side, causing oscillation and diving.

Try out this model—we guarantee it will afford you many hours of interesting and instructive flying. You will be able to control it very precisely and with practice will be able to have it fly predetermined courses with precision.

Mr. James M. Cubbage, Jr., Box 784, Point Marion, Pa., writes us that he is a graduate aeronautical engineer and has been building planes for some thirteen years. Recently he decided to design and build a Canard model. Fig. 2 shows a side view layout of his finished plane. It was powered by a *K & B Infant* motor. The rear wing had an area of 128 sq.in., the front wing 42 sq.in., the rear wing span was 32" with a 4" chord set at an angle of incidence 0°, dihedral was 3" at each wing tip. The front wing had a span of 14", a chord of 3" and a dihedral at each tip of 1". The center of gravity was located 72% of the distance between the wing mid-chord points, back of the center of the forward wing. Concerning the performance of this model, Mr. Cubbage writes:

"Flight performance of this configuration was encouraging but not satisfactory. The glide in calm weather was flat with no mushing apparent. However in a slight breeze the ship was laterally unstable to an alarming degree. In the same breeze under power, however, this unstability disappeared almost entirely. On one particular flight a curious thing happened. Upon launching, the ship started into a nice climbing turn to the right. When the engine cut, the nose dropped immediately and the ship went into a *vertical* dive, rotating about the longitudinal axis much as an arrow might. It never recovered, but no damage resulted from the crash. This maneuver was not repeated in following flights so I blamed it on an air pocket since the ship was over a strip mine at the time."

"I reasoned that the lateral instability was due to the high CLA (due to the rudder location) and in some degree to the swept back rear wing. I decided to eliminate each, one at a time, to determine their effectiveness. I then built a wing with the same area, section, dimensions but with no sweep back. The rudders were placed in the same position. Unfortunately I was unable to thoroughly test this version since it was stolen on the first flight. However, I was able to observe on this flight that lateral stability had improved somewhat during glide."

Subsequently, Mr. Cubbage built another model in which the C.L.A. was lower. This appeared to give better results. However, we believe that the fundamental trouble does not lie entirely in the C.L.A.

(Turn to page 50)


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position or the sweep back of the wings. From many years experience with pushers, we would say this design is fundamentally wrong especially in respect to the vertical disposition of the forward wing and to the amount of dihedral on both wings. The dive and spinning described by Mr. Cubbage could be attributed to the low position of the forward wing. This never should be placed as low as shown in Fig. 2. Lateral and longitudinal stability is materially reduced in many attitudes of flight, especially in nose-down position. In a steep dive it is possible that the drag of the forward wing being below the center of gravity, could have prevented the nose from rising with resultant recovery during the dive.

Another feature could have caused extreme lateral oscillation. It has been recognized that when the wings of a Canard pusher are nearly equal in dihedral angle, as are these wings, the plane has considerable tendency to rock or roll from side to side. It was determined through experiments by the author that dihedral angles should have different values on rear and front wings. With the same angular values the period of oscillation is the same and produces a harmonic reaction. When they are unequal to a considerable degree, one fights or compensates the other. Also the rear wing dihedral never should be greater than that of the front wing, as is the case in this model. Best results are obtained when the front wing dihedral is at least one and one-half times that of the rear wing in gas models, and about 15° to 20° on each half wing in rubber models. Often as much as 18° on each half wing in gas models proves most efficient.

In this case the forward wing should be raised well above the thrust line, as indicated in Fig. 3. The forward wing in this position, during a side slip of the nose, tends to rock the plane back into level flight. With the forward wing low, recovery forces are extremely small if not entirely absent.

The rear wing in Fig. 2 has more than 1" dihedral per foot of span on each tip. Usually best results in pushers result when the dihedral is from 1/2" per foot of span to 3/4", on each tip. In this case the front wing should have a dihedral on each tip of at least 1.6" and the rear wing should have a dihedral of only 1.3", on each tip. Of course, this will move the center of lateral area forward proportionately. It will be necessary to add fin area at the rear beneath the wing, in order to compensate for the reduction of side area at the rear, due to less dihedral of the large rear wing. Fig. 3, shows the corrected arrangement. If Mr. Cubbage will design and fly a plane as in Fig. 3, we believe that his stability troubles will be eliminated.

Sometime ago we received a letter from M. Gaster of 35 Kings Gardens, West End Lane, London, N.W.:. He comments on a statement which we made that the sinking velocities of model planes were inversely proportional to the sq. root of the lift coefficient, or $\sqrt{1/C_L}$. We believe he will find this statement to be correct. It does not mean that other factors such as weight, area and coefficient of drag are not involved. This statement was made with the understanding that the lift/drag ratio remained the same.

The accuracy of this may be shown very readily in Fig. 4. The glide path AB of a plane is indicated. BC is proportional to the lift and AC to the drag. These two lines give the lift/drag ratio. Now supposing, we have a second plane whose coefficient, for the sake of example, is *4 times* as great as our first plane which had a sinking velocity AC. The speed of this second plane will be *half as much* as the first plane because the lift will be 4 times as great. Consequently, with the same lift/drag ratio, it will travel along path AB but at *half the speed* so that it reaches point X in the same length of time that the first plane reaches point B, during the glide. The sinking velocity of this plane then is represented by AY which is just half of AB.

It is shown clearly therefore that by increasing the lift coefficient (with the same L/D) and therefore the lift of the plane, the plane flies more slowly and sinks less rapidly.

However, suppose the lift/drag ratio of plane #2 decreases, so the glide path becomes AZ, the lift remaining the same. Then the ratio of ZC to AC gives the lift/drag ratio and the length of AC represents the sinking velocity, which is the same as plane #1 and double that of plane #2. It is obvious therefore that the L/D ratio of plane #2, with increased C_L compared to plane #1, has to be reduced to one-half of its original value before the sinking velocity equals that of plane #1. Seldom does the drag increase to such an extent, when the C_L is increased, that L/D is reduced to as little as one half of its value prevailing before C_L was increased.

Mr. Gaster gives rather a large number of formulas in his letter, apparently to show that this is not true. Evidently he is expressing this same relationship in other terms. We are unable to give you an accurate analysis of his formulas because they are written by hand and a number of his symbols cannot be accurately distinguished. Also he does not state what a number of the unusual symbols represent.

Send your comments and questions for our discussion in future articles to Design Forum, 551 Fifth Ave., New York, New York.

Model Skyshark

(*Continued from page* 15)

cover the top of the wing. Add the wing tip blocks and wing-fuselage fairing block. Carve and sand to shape when thoroughly dry. Fasten the wing to the fuselage using plenty of cement. Check for the correct incidence angle. Add the fin and offset rudder. Note that the fin fairs smoothly into the fuselage.

Add the cockpit canopy. We painted the fuselage top under the canopy roughly, and installed a dime plastic pilot for realism. Use heavy celluloid sheet and install the top piece first. When dry the sides can be added. Trim off excess after the entire assembly is thoroughly dry. Mask off the cockpit windows before painting them.

Add the control line guides, install the landing gear fairing blocks and aluminum covers, and the bomb mounts plus tail wheel and arresting hook. We turned our spinner from pine; however we are sure that a commercial plastic or aluminum spinner can be found to fit the model perfectly.

It is suggested that plenty of wood filler be used in order to obtain a good finish. Apply at least four coats with intermittent sandings. When a smooth glass-like surface has been obtained, the color can be applied. The entire plane is dark Navy blue. We brushed on three coats. When the last coat is thoroughly dry (at least 12 hours) the entire model can be rubbed with a fine rubbing compound to obtain a fine lustre. The air intake and exhaust panels were cut from silver *Trim-Film.* All lettering is white. We did the lettering on Dura-Seal and then peeled off this cellulose sheet and stuck it to the model. Dura-Seal is available at most large stationery or art supply stores. Insignia is cut from *Trim-Film.* When the model is complete, cut the engine hatch loose, remove engine and clean it, and apply two coats of Fuel Proofer to the entire model including the cowl interior. We made our propeller by lap jointing three 12" dia. 6" pitch propeller blades left over from previous crack-ups. Use casein or other strong glue and glue under pressure. When complete, saw off the blades to a 7-1/2" or 8" diameter. This prop may not be the most efficient prop in the world, but it sure looks like the real thing and operates well enough. Blades are black with yellow tips.

Balance the model where shown on the plans. We used 50 foot lines of .012" diameter. The model has very conventional flight characteristics and the average modeller should encounter no problems whatever in this model of the latest Navy attack plane.

Air Ways

(*Continued from page 29*)

Picture No. 1 this month was sent to us by Lt. Tom Mahon (AO-686258, 7167th S. A. M. Squadron, A.P.O. 633, c/o PM, New York, N.Y.) who has been situated in Germany acting as a pilot in a Special Air Mission Squadron. Although they fly all over the continent, the Lieutenant states that he makes the best of the limited time available for model building. Several months ago, he and some modeling friends started a plane and car club which has grown until it is now quite impressive. Their greatest problem is in arranging shipment of modeling materials. Lt. Mahon states that most of the flyers in the club are U-Control enthusiasts but he sticks pretty closely to free flight. His latest ship which is pictured herewith is a *Scientific Mercury* built during the very limited amount of free time he had while engaged in the recent Berlin Airlift. The plane is covered with double *Silkspan* and is powered with an ignition *Ohlsson 60*. He doesn't give any details of results but we presume the Lieutenant has enjoyed flying this realistic ship.

The second photograph was sent us by E. Flores (146 High Street, Birkirhara Malta, Europe), who tells us that this scale model of the Gloster *Gladiator* has a span of 28" and is built out of tin cans. Considering the material he used, we feel this is an exceedingly attractive model.

Bud Johnson (1010 S. Fran, Rosemead, Calif.) is an enthusiast for tailless models, and Picture No. 3 shows his attractive 1/2-A job which has a span of 40" and is powered by a *Baby Spitfire*. Bud calls this ship *Crazy Rhythm*, but states that it is a very fine flyer with a flat glide, and travels at quite high speed. The model is built very solidly with the forward portion of the wings sheeted top and bottom; the fuselage is constructed of hollowed-out balsa blocks. A shear-pin wing mounting is used, and this proved a lifesaver during the early test flights. Bud is apparently a real old-time modeler, as he states that his collection of M.A.N. issues goes back to 1933, and he can clearly remember the first covers painted by our long-time artist, Jo Kotula.

Something really unusual will be seen in Photograph No. 4 which depicts a biplane rubber model made to Wakefield specifications. This novel ship is the work of G. H. Berry (2566 E. 45th Avenue, Vancouver, B.C., Canada) who states that even though the airplane was somewhat overweight, it turned in many very consistent flights. After a losing bout with a tree, a new set of wings were built with an area of 280 sq. in. Weight was then 12-1/2 oz., and the airplane turned in consistent 1-1/2 to 2 min. flights on 600 turns. Power was 18 strands of 1/4" English black rubber with a 16" *Testor* prop. The top wing and pylon can be moved fore and aft for adjustment, and the landing gear is made from umbrella ribs which are found to stand up perfectly under very heavy use. This model was inspired by suggestions in one of the Design Forum columns of C. H. Grant.

For contrast we present in Picture No. 5 a more conventional Wakefield ship built by Frank Bethwaite (Auckland, New Zealand) who was a member of the New Zealand Wakefield team in both 1949 and 1950. The picture was sent to us by Charles R. Wood (3002 46th Ave., S.W., Seattle 6, Washington). This airplane is based on Mr. Wood's Wakefield Design, *Yankee IV*, and features the NACA 4612 airfoil with twin rudders and retracting landing gear. Mr. Bethwaite reports it is the smoothest flying Wakefield he has built to date and has an exceptional glide. Close inspection of the photograph will show that an unusual propeller is featured; this is a fully feathering type. It will probably be changed to the more conventional folding prop, however, as Mr. Bethwaite now feels that the prop, when in the feathered position, tends to disturb the airflow over the center portion of the wings. This airplane was started by Mr. Bethwaite after he had read the inter-

esting discussion of the ship by C. H. Grant in the Design Forum column of the April, 1950 M.A.N.

The Radio Control enthusiasts are represented this month by Frank J. Madl (4647 N. Cicero Avenue, Chicago 30, Illinois) who appears in Picture No. 6 with his *Custom Cavalier* airplane. This ship is modified a bit from the original design, has a 9-1/2' span and weighs approximately 12 lbs. ready to fly. It was originally flown for about 6 years as a conventional free flight ship but has been under Radio Control for the last 2 years. At the present time, the radio equipment consists of a five channel *Rockwood* system which is arranged to give self-centering rudder action, two speed motor control, and also elevator control. Previous to the installation of the *Rockwood* equipment, the ship was flown with rudder control only, utilizing *Beacon* equipment which worked out quite successfully.

The very accurate scale S.E.5 in Picture No. 7 is the work of Kenneth Jensen and the photograph was sent in by his friend, John Olson (703-1/2 W. 3rd St., Hastings, Minnesota). The airplane was made from Wylam Masterplans to a 24" span, and the entire ship is strictly to scale including the interior of the cockpit.

Picture No. 8 shows Mario Syracuse (Denver, Colorado) holding a very unusual Luscombe scale model. This airplane was flown control line and is fitted with a set of neon-tube lights which may be seen at various points along the fuselage and tail. The airplane was built at a time when Mr. Syracuse was attempting to interest the city authorities in the hobby of model aviation, and was flown at night in various parts of the area. The plane attracted so much attention that the campaign was a complete success, since model aviation is now an accepted part of the Denver Recreational Program, and the city provides and maintains several very active flying areas. The airplane is an exact scale copy of the Luscombe, and power for the neon lights is supplied by several high tension transformers and a 9 V. battery. The airplane has made around 100 flights, weighs 6-1/2 lbs. and has a 76" wing span. If model plane leaders in other parts of the country are having difficulty enlisting the support of their local authorities in their model airplane activity, we are sure Mr. Syracuse would be more than glad to give them the benefit of his successful efforts along these lines.

The exact scale Roland D-2 biplane in Picture No. 9 was built by Lt. James S. Appleby (Lackland AFB, San Antonio, Texas). It took first place in a flying scale event at a contest held at the Base on August 20. The airplane was built from the detailed scale drawings of the big plane by Joe Nieto which have appeared in recent issues of M.A.N., and Mr. Nieto brought the airplane to Dallas where it made several exhibition flights. The scale airfoil with a large amount of undercamber is used on the plane, and many of the modelers at Dallas who saw it before the exhibition flight had some doubts as to its flying ability, but it proved to be very maneuverable and stable. The plane is powered by an inverted *Ohlsson 29* and has a top speed of about 60 mph. The fuselage is of the hollowed-out balsa variety while the wings are built up and silk-covered. Hardwood struts are employed with stainless steel rigging. The finish includes four coats of dark grey dope with an overcoat of *Sta* fuel-proofer. Lt. Appleby, who started his model building career in 1935 with the old KG gassie, did most of his flying at his home in Asbury Park, New Jersey, and is known mostly for his speed models.

Picture No. 10 shows something rather unusual in this country—a jet-powered free flight model built by G. Evans Codding (942 S. Gramercy Dr., Los Angeles, Calif.). This airplane has a 78" span and weighs almost 3 lbs. The plane is basically a *Comet Sailplane*, but the original engine has been replaced by a *Dynajet Redhead*. The landing gear is of the bicycle type with the rear wheel retractable. Flying tests indicate a moderate speed, approximately the same as conventional engine-powered models of the same size. The jet has been fitted with a variable speed nozzle to allow a certain degree of power control, and the glide seems to be somewhat superior to the average contest type, due possibly to the lack of a propeller.

The little 1/2-A float plane in Picture No. 11 is the work of the well-known Canadian model designer Bruce Lester (254 Glen Park Avenue, Toronto, Ontario, Canada). He calls this ship the *Sandpiper* and built it just to have some fun on a recent vacation. Power is an *.045 Cub* and the floats were designed and placed at an angle on the ship so that they would contribute to the lift. Mr. Lester tells us that this design feature is apparently a success as the little plane is a very fine flyer and generally takes off from the water after a run of 6' or less.

An old-time design which is still popular appears in Picture No. 12 where we see John Marotta (7512 Jamaica Avenue, Woodhaven 21, New York) holding the uncovered framework of a *Yogi* pusher, which is powered by an *O. K. Bantam* engine. The propeller which came with the kit did not appear to work too well with the *Bantam* engine, but John carved a pushed prop of his own design which seemed to operate very well. He tells us that he is a member of the recently re-formed *Prop Spinners Club* which is situated at Elmhurst, New York.

News of Modelers

PEN-PAL SEEKERS: Walter R. Pearsall, 1400 15 St., N.W., Washington 5, D.C. is very interested in free flight and rubber scale models and would like to correspond with someone who is a scale model builder, preferably in Europe . . . Robert Thomson and Ian Proven, 62A Ashbourne Road, Liverpool 17, England would like to write to a couple of American modelers.

SPECIAL REQUESTS: Bruce Johnston, 9632 San Vincente, South Gate, California would like to exchange a *Torpedo Jr. .035*, which he has in his possession, for a *Mercury Marlin* stunt kit which is made in England . . . Edward A. Moran, 3629 Oxford Avenue, Riverdale, New York has a supply of past issues of M.A.N. which he is willing to part with, for those of you who cannot obtain them elsewhere.

EXCHANGE MOTORS: A. E. Dowdeswell, 7 Victoria Street, Barton Street, Gloucester, England would like to exchange a Mark II *Mills* 1:3 c.c. Diesel for a Jet . . . T. S. Holmes, 6 Hyde Vale, Greenwich, London, S.E., 10, England would be glad to exchange any of his British motors for either a *Dooling 29 or 61*.

CLUB NEWS

California

The second contest of the *Northern California Free Flight Council* was held August 20 at Sacramento. High time of the day was won by John Lenderman, *Class B*, with 14:15. Other winners were: *Class 1/2-A*—Milton Henderson 11:25; *Class A*—John Drobshoff 12:15.5; *Class C*—John Tatone 11:40. High time Junior trophy was won by Robert McQuade in Class A with 10:36.

The San Francisco Recreation and Park Department sent in the results of the Class

(*Turn to page 54*)

B Towline Glider Contest held in August. Dan Sullivan was the winner with a time of 1:31. Other winners were: Second place, Gale Stromberg :104.7; Third, Joe Grey :72.2.

June Dyer has given us the results of the California State Free Flight Championship Meet, sponsored by the *East Bay Aeroneer Association* on August 13. High time of the day was won by Gene Hildeman in *Class C* with 12:28. Other times were: *Class 1/2-A*—James Freshman 8:16.5; *Class A*—Robert McQuade in 10:34; *Class B*—Don Foote 9:53.3. We are sorry to say that this was the final contest for the *East Bay Association;* the famous free-flight club is apparently going out of existence. It is interesting to note that every contestant received a prize at this final meet of the *Association.* The Class B win by Don Foote was accomplished with a *Foote Racer* (see Sept. '50 M.A.N., page 11).

Florida

Thomas Mickler, President of the *Exchange Club* of Orlando has written in news of the model plane activity sponsored by his club. Their first annual mid-winter International Model Airplane Meet will be held in Orlando about the first of the year. The events will include control line, radio control, jet and free flight, in all age groups and classes. The Meet will be held at an airport which has two 10,000′ runways. There will be barracks and hotel accommodations for those of you who can attend.

Illinois

Hart G. Betts of the Galloway-Betts Model Shop, sent us the results of the *Aurora Model Plane Club's* contests, which were held for club members only, during 1950. *Juniors*—1. Wayne Schaub; 2., Owen Richards; 3., Bob Miller. *Seniors*—1. Maurice McEvoy; 2., John Barr; 3., Adolph Meisch. This club concentrates on team races, stunt and speed in the U-control field, and makes special efforts to aid juniors. The President of the club is Harry Kelley and the Junior Vice-President is Owen Richards. The club has its own flying field, to be fitted for night flying in '51.

Maine

In our last issue we told you to address all correspondence for the *Flying Maniacs* to Stan Davis, 61-1/2 Chestnut Street, Augusta, Maine. As of this date, any news letters are to be sent to A. P. Mack, 340 State Street, Augusta, Maine. Howard Smith, formerly with the *Maniacs* would appreciate some mail at his new Army address—Cpl. H. E. Smith, AF 3122-243, HQ & HQ. SQDN. SAAMA, Kelly AFB, San Antonio, Texas.

Minnesota

The 2nd Upper Midwest PAA-Load Meet was held on August 13 in Minneapolis. Although this Meet was originally intended for PAA-Load only, it finally "snowballed" into one of the best meets ever held in the area after Radio Control, Stunt and Team Racing events were added, according to Walter Billett who sent in the results. Winners were as follows: *Class A Jr.-Sr.*—1st, William Krawczak 3:11.8; 2nd, Warner Buchelt 2:37.7; 3rd, Donald Strand :43.1. *Class A Open*—1st, Donald Medved 6:47.3; 2nd, John Chandler 2:43.8; 3rd, Robert Sweger 2:21.8. *Class B Jr.-Sr.*—1st, Donald Christich 3:2.0; 2nd, Warner Buchelt 1:45.5; 3rd, Jack Gallen 1:35.6. *Class B Open*—1st, Donald Medved 3:7.3; 2nd, Robert Sweger 2:11.0; 3rd, Robert McBride 1:22.1. We didn't receive any results on the Radio Control, Stunt and Team Racing events; they must have been exhibition bouts.

New York

The winners of the Plymouth Dealers 4th Annual Model Airplane Contest held at the Hicksville-Westbury, L.I. Model Flying Field are as follows: *Class 1/2-A*—Stewart Savage 12:42.2; *Class A*—Ronald Thompson 14:32.6; *Class B*—Karl Birkel 16:15.7; *Class C*—Edward Mahler 19:30.5. Winners of the other events were: *Rubber*—Natale Giovine 20:16.0; *Towline* — Paul Mueller 15:25.0; *Nassau Event,* which was a special combined classes event—James Ziegler 10:00. According to William Johnke, the Contest Director, contestants for this event were invited from the five boroughs of New York City and from Suffolk and Nassau counties, but, of course, no fliers were denied entry.

Pennsylvania

Clarence Wells, Vice President of the *Bucks County Federation of Model Clubs* sent in the latest information on their doings. Five meets were conducted by them under AMA sanction, four being Class A meets. In mid-October the *Federation* conducted a large Team Racing meet for anyone who would like to enter. The Pennsylvania Area Plymouth meet was conducted by the Bucks County Federation this year, and it was very well attended, since members pledge their support on this.

Greece

We have some news on modeling in Greece, which was sent in by Mr. Anastassios G. Sapounakis. There is no model club in Greece under an official name but the activity operates within the Greek Glider Corps. Association. Modeling in Greece is still in its infancy due to the lack of materials and difficulty in obtaining an area to fly in. Modelers are having better luck with seaplanes and flying boats because they can obtain permission to fly on water more easily than on land.

South Africa

News from modelers in South Africa reaches us via "The Flypaper," the South African aeromodeler's magazine. Recent record holders for South Africa are as follows: *Class A Free-flight*—R. Rowe 955 secs.; *Class B Speed*—R. D. Masters 116.3 mph. *Class A Speed*—E. Allen 95.71 mph; *Class C Speed*—E. Allen 112.46 mph; *Jetex Open*—J. M. Malherbe 211 sec.; *Wakefield Jr.*—J. R. Stow 136.1 secs.; *Class A Rubber Sr.*—R. V. D. Merwe 178 secs.; *Jr.*—W. V. Rensburg 40.2 secs.; *Class B Rubber Sr.*—R. V. D. Merwe 150.4 secs.; *Jr.*—S. V. Rensburg 183 secs.; *CO-2 Open*—E. Ritchie 388 secs.; *Jet Speed*—P. Binet 136.36 mph.

For Contestants Only

(*Continued from page* 13)

It is quite evident that these advocates of restricted flying lack an understanding of the ideals of free flight. Can you see what would happen if the elements of luck (the thermal) and initiative (*free* free flight) were kicked out? Keep this in mind—I am speaking of these things as they affect the national rules. The AMA rules have a tremendous influence upon the type of building and flying we do. Therefore, it is essential that we move cautiously and look ahead if any big changes are made. Such things as regulated flight pattern, and closest-to-the-4½-minute-total could appeal to you or me as something new. We could probably have a lot of fun with some of this type of flying, but there is a catch. Any popularity acquired might soon fade away leaving the ranks of free flighters considerably thinned. (This much should be kept clear; the old-timers would never give up their phase of the sport, but the beginners, who must keep coming in if the hobby is to stay alive, would be discouraged by too much detail from the start, and too little exciting flying. They would turn to something other than free flight.) The new types of flying can be tried by anyone who wishes because nobody tells you what you have to build. Various sections and even certain clubs may prefer different forms of competition because of geographical location, shortage of flying fields, or weather.

Trends. There are two that tie for first place. First, the rise of the competition flier, and second, the "easy" (lazy?) revolution found in prefab kits. "Competition flier" means just what the term implies. There has been a steady rise in contest attendance records (with small exceptions) since the hobby first started. It looks like we are participating in a very successful enterprise. Now, what about this "easy" trend with build-it-tonight-fly-it-tomorrow kits? I can't say it isn't good because rapid-construction models have done wonders in bringing in new recruits to the hobby. It is fine for the beginner who wants to get his ship into the air with a minimum of work. Because if everybody builds more and buys more, the manufacturer can give you more value for your money. But here's the rub. We all like to think the beginner has been given a good start in modeling and that he will progress toward better airplanes, and eventually original designs. What happens? One year, two years later he is still building simple throw-it-together clunks. He has no ideas of even the simplest aerodynamics, good construction, or any of the knowledge he should have acquired. He cannot say that he has accomplished anything, or that he even has a goal in sight. These things are important to me and I worry about them—maybe a lot of builders just don't care.

There has been a power-up trend, and it started with the rise of the controline model. We have motors today that have more than double the horsepower available from the same displacement in prewar days. Our club began making power tests back in early '41. We recently came up with some interesting results. An old .19 was run against a modern engine, both with the same run-in time. The old one showed 20 oz. of thrust, roaring as defiantly as it could. The postwar .19 eased the scales up to 36 oz. of static thrust. We tested a .60 and a .65. The old .60 really strained to put out 64 oz. We started the .65 and leaned it out. Whamm! It yanked the scales to the limit, over 100 oz. You must include in these tests the improvement in fuels, the addition of glow ignition, and the increased efficiency in propeller design. We have noted also a decided increase in rpm for a given size of propeller. Most motors now have a nearly equal bore and stroke proportion, which means higher rpm. Engine designers have given more attention to good porting. The advancement in engine design has had much effect on the swing toward big planes with comparatively small motors. If you tried to pull aloft 1,500 sq. in. and 60 oz., with a motor putting out only 60 oz. of thrust you would not get very far.

The change from scale realism to strictly functional model aircraft designs. This actually happened some time ago but it is something upon which to reflect. Model builders in the early days of gas model flying soon found that the exact scale replica of a real plane did not fly very well, mainly because it did not have a pilot to correct for the lack of inherent stability. This stability was very definitely needed in the models so there followed a rush of new strictly *model aircraft* designs. The consistency built into these ships was complemented by ever increasing power, and things kept progressing toward today's high-flying models, yet we still hear, "Too many pylon jobs, we need more realism." Well, I wonder . . .

The motor, class setup. Because of a near-equality in times between A and C there was a move to divide free flight into only two classes—all below .099, and all above. It seems to me that would leave the B and C fans out in the cold. I like the big ships and the medium and the small. I don't want to have to stop building any of these just because the small class happens to have the most popularity now. I can remember when the big ships enjoyed a much greater numbers advantage than did the Class A jobs. No one tried to throw everything under .30 into one class. The divisions do not have to be determined by the flight times. The classes should be arranged by motor size (which generally affects plane size) just as they are now. I have noticed at the contests, and I have found it to be true myself, that although there are not as many big jobs present, *they* are the ships that fly most consistently and reappear at the next contest. The A kits require less time and money and are preferred by the beginner and the "easy" group. Sure—that's okay. I am sometimes reluctant to start on that big eight-footer, too, but there is a great attraction for a big craft once you have built one. Now for a prediction: if, for some reason, all classes were thrown together, you would soon see a swing back to the big motors and large aircraft. Not very long ago B was the most popular event; it still is pretty hot. We need three popular classes in free flight, small, medium, and large: .00 to .099—.10 to .299—.30 to .65 up. Wait a minute! Before you .199 fans jump all over me, remember that the big A's and the B jobs are very nearly the same in size and performance. The engines below .10 are at somewhat of a disadvantage when they are confronted with quick O.O.S. flights and windy weather.

Locally, we have real enthusiasm for the baby engines. Our club has been building ½ A flying scale jobs, and we never had so much fun. Just imagine a Fokker D-7 in full battle array scooting down the runway and roaring off into the clouds. Almost any scale ship can be adapted, and many kits are now on the market. We get a big charge out of the way some of the little fighters screech around the field performing more stunts than the Navy's Blue Angels. These tiny ships really take a beating too. Because of their small size they have a good strength to weight proportion. K. Q. White got over twenty flights one morning on a 200 sq. in. Bristol *Bullet*, a World War I biplane. This little .045 powered fighter would come crashing madly in nearly every time (K. Q. stubbornly refused to put in some needed adjustments we recommended, and insisted on doing buzz jobs around us while we were getting airborne). The Bristol would come roaring down in a power dive and whop into the ground with a thud that would have shattered an ordinary free flight. Nonchalantly K. Q. would walk over to the plane, pick a few weeds out of the cowl, and crank it up again.

Here's the deal as we see it; put all engines under .10 into a flying scale class (with the option of flying in the regular Class A if desired). This event would take the place of rubber-powered flying scale as well as small A. Rubber-powered flying scale fans would not be losing anything. They would, instead, benefit by such things as scale props, long, steady power runs, shorter landing gears, and more

competition. It might take a while for such an event to get started, but once it did, flying scale free flight could become one of the most popular. The spectators would go wild watching these small realistic aircraft performing within easy range of their vision. (These flying scale ships do not ordinarily catch thermals or wander very far from the field.) Here is the type of flying that would make a hit with the "realism" faction. We have already seen a preview of success in the way that controline scale draws crowds. Among the many problems arising would be the all important one of an easy and fair method of judging the flights and the models. If you think that would be tough, to start with, just look at the timers' check sheet for controline stunt. It shouldn't be so difficult to work out flying scale rules. Due credit should be given to those patient modelers who have been pushing this type of flying for many years. What we need now is action. So, take out the plans for that favorite scale job and start building!

Comments overheard. Controline stunt spectator: "You see one and you've seen them all. Personally, I would get dizzy." (People must be getting into a rut, because, I have heard this remark many times.)

Free flight spectator: "Why doesn't it come down?" Okay, so I *didn't* finish the dethermalizer!

Hobby dealer: "I don't know what's wrong with this new bunch of model builders. They are so — — — — lazy, the guys like to say they've built the model themselves, yet they expect everything done for them except the last ten minutes of work, when I sell them a kit." (Some people call it progress!)

Someone said: "Any reliable airplane with any reasonable motor and adjustments can hook a thermal." (Yes sir, I've been trying to find that combination, *and keep it*, for many years!)

Another person also stated, in reporting on apparently "dead air" times: "Six to seven minutes in the rain at Olathe." (Yes we saw it too, but just so the average modeler won't be disillusioned with his little four - minutes - on - twenty - seconds flights, this statement should be clarified. It happened on "C Day" at the '49 Nationals. The rain fell quite consistently all day after the clouds shut off the sun at nine in the morning. About three in the afternoon the officials stated that the event would not be held over until the next day. Everyone who had been holding off because of the damp weather rushed out to the water-covered runways. Among all the uproar of the "Berlin blockade take-off schedule," I noticed some of the high-flying ships dodging in and out of the low overcast. It was still raining and the ragged, stirred-up appearance of the clouds suggested that there was thermal activity around them. I also found that the huge concrete runways had stored up a tremendous amount of heat during the previous sunny days and they continued to radiate this energy long afterward. This was especially noticeable when there was a drop in air temperature. Those six- and seven-minute flights took place over the hot runways so, despite rain and all, they were still the result of rising air currents.)

Some cad remarked: "Few fly Class D for fun." (Well "by Entrop," *we* do, and we have fun too!)

A modeler stated: "We need something to boost spectator interest." (Very definitely yes, let's have ½ A free flight flying scale jobs that stay within view of the audience. Team racing too is already doing great things in this line.)

For a long time we have thought: A good contest ship still has to be an all-round-all-weather model, with a dethermalizer (that works). We would like to see some "live" competition along with that battle against the cold stop watch. The real modeler is the one who builds all types, from stick rubber models to team racers, and goes sport flying as well as contest grinding.

See you at the 1951 Nationals!

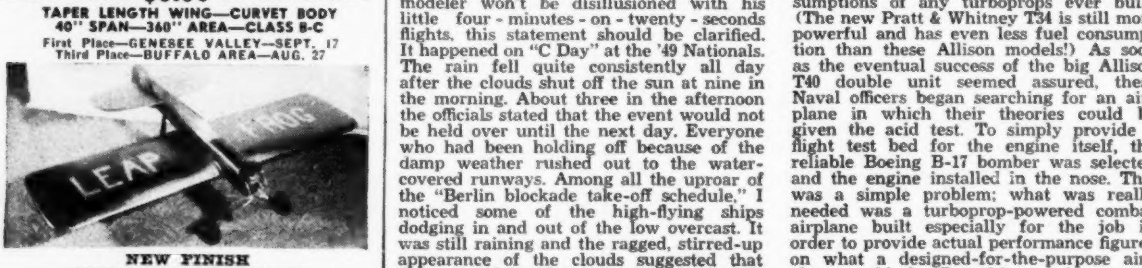
Douglas A2D-1

(*Continued from page* 19)

about 250 mph and the Curtiss SBC *Helldiver* something less than 300 mph!). These officers in the Bureau of Aeronautics Power Plant Section knew, on the basis of practical tests plus numerous theoretical studies, that the turboprop engine promised a specific fuel consumption of only *one-half* that of the turbojet engine and, if properly developed, a *lower* fuel consumption than the keenly-developed reciprocating engine. These promises were simply too good to ignore and these officers fought hard for the very small appropriations required to keep turboprop engine development alive.

Happily they won out. Despite constant criticism and heavy economy pressure, the Navy maintained its Allison T38 and T40 turboprop engine projects, culminating in successful static tests of these engines at the highest powers and lowest fuel consumptions of any turboprops ever built. (The new Pratt & Whitney T34 is still more powerful and has even less fuel consumption than these Allison models!) As soon as the eventual success of the big Allison T40 double unit seemed assured, these Naval officers began searching for an airplane in which their theories could be given the acid test. To simply provide a flight test bed for the engine itself, the reliable Boeing B-17 bomber was selected and the engine installed in the nose. This was a simple problem; what was really needed was a turboprop-powered combat airplane built especially for the job in order to provide actual performance figures on what a designed-for-the-purpose airplane could do. But this wasn't so easy for there were little if any procurement funds for such a project, which could easily run into $5-10 million!

The Navy selected the Douglas AD *Skyraider* for its guinea pig for several reasons. First of all it was in quantity pro-



duction and a tried-and-proved airplane. Secondly, it was the Navy's standard attack plane and, consequently, the one the new turboprop-powered craft would replace, if and when it was proven successful. It therefore provided not only an economical source for testing their theories but also an excellent yardstick against which to gauge the new performance.

Prior to this Navy decision, however, Douglas engineers had not been exactly idle. They, too, had seen the possibilities of both greatly increased performance and increased range in the turboprop engine and had made design studies of the AD *Skyraider* powered by a General Electric TG-100 turboprop engine. Plans were completed for an experimental conversion but difficulties with the engine forced eventual abandonment of the project. At this early stage in turboprop history, Douglas engineers decided to build their own turboprop engine for the *Skyraider* through assembling various components. Design studies were completed on the installation of two Westinghouse 24C turbojet engines side by side with their tailpipe exhaust driving a large turbine which, in turn, drove counter-rotating propellers.

With the probability of extensive development problems on such an arrangement, the *Skyraider* design crew next turned to a side by side installation of the two Westinghouse 24C turbojet engines without the turbine, resulting in a pure jet version of the big attack plane. Individual air inlets were located in the nose with the jets exhausting out of exits below the wing. This arrangement gave the airplane a good high speed but, like all turbojet arrangements, presented serious take-off and endurance requirements for an attack-type airplane. It was at this point that Douglas' individual design development of the *Skyraider* and the Navy's decision to equip a flying tactical test airplane with the new Allison T40 turboprop engine came together and merged into a single, joint project. The result is the Douglas XA2D-1 *Skyshark*, our Plane of the Month.

There are, of course, only two ways in which the performance of a given airplane can be increased: reducing its drag or increasing its power. Douglas took *both* courses. The 17% wing root thickness on the standard AD series was reduced to less than 12% on the new model, with a corresponding reduction in tail thickness. Not only does this reduced thickness lower the parasite drag of the wing on the AD but it also delays the onset of compressibility difficulties. The power was better than doubled: from the 2,500 hp of the standard Wright R-3350-24W to the 5,500 hp of the Allison XT40-A-2 turboprop engine. For reasons of balance, this model of the Allison T40 engine is fitted with a short extension shaft.

But the design job turned out to be much more than the simple one of switching engines. As the design progressed, more and more standard *Skyraider* parts proved unusable until there remained little of the original airplane. These changes were required due to the fact that the tremendous increase in power and performance brought with it much greater loads on the airplane and the necessity for increased structural strength. The location of the engine weight back over the wing, instead of forward in the nose as in the standard installation, meant balance changes resulting in different stability requirements and, therefore, empennage changes. As a result there is actually little of the parent AD *Skyraider* in the new A2D *Skyshark*. The wing planform remained the same and the same landing gear and cockpit arrangement is used but even these are not the original parts, since the landing gear, for instance, had to be strengthened and its stroke increased.

One of the factors often overlooked in a cursory examination of the piston-vs-turbine aircraft engine comparison, in which the lighter weight of the latter is always emphasized, is the tremendously increased length of the gas turbine engine over its compact piston rival. In this case, the Wright R-3350 is only 82" long (less than 7'), while the Allison T40 is over 16' long, more than twice as much. This increased length that must be provided for, resulted in an overall increase of about 3-1/2' in the length of the new A2D over its predecessor.

The A2D pilot, who sits atop the dual drive shafts of the engine, is located well forward in the new *Skyshark* to provide all available vision. It will be seen that, unlike the smooth blown canopy of the *Skyraider*, the new turboprop attack plane has an awkward-looking, slab-sided enclosure. Like every other line in the airplane, however, there is a reason for this. At the speeds of which the new plane is capable, friction of the air generates as high as 50° F of temperature over the ambient air which, on a warm day, is enough to soften the familiar blown plastic canopy materials. The A2D canopy uses old-fashioned glass, which can take plenty of heat before losing its strength or shape. Such glass is very difficult and expensive to form into compound curves (which the owner of many of the new automobiles has discovered after breaking a windshield!) so that the A2D canopy consists simply of flat panels, with the top surface curved in one plane only. Location of the engine drive shafts below the pilot prohibited use of the "escape tunnel" used on the Douglas F3D *Sky Knight* fighter and the A2D is fitted with the conventional upward-firing ejection seat.

The new attack plane features one of the first installations of the AiResearch starting system. The Navy required that the A2D be able to get started without external power supply and the battery power required to turn the big turbine engine up to ignition speed was extremely large. The light-weight AiResearch unit is merely a small gas turbine engine producing air, which is piped to another small air turbine attached to the engine. AiResearch also used another turbine for cabin pressurizing and temperature control, making the *Skyshark* virtually an all-turbine airplane.

Neither Douglas nor the Navy will discuss the performance of the new attack plane but it is certainly safe to say that it is mighty close to being a 500 mph combat craft, some even putting its top speed up to 550 mph. It is certain, however, that its take-off run is phenomenally short. When you consider that from a dead start it has about 18,000 lb. of thrust and weighs just about 18,000 lb. you can appreciate that it can climb off even a tiny escort carrier in an almost vertical zoom. By shutting down one of the two separate engines making up the complete Allison T40 power plant, the A2D can cruise for better than 1,500 mi. while using only the same amount of fuel with the same bomb load as the AD. For the efficiency experts, Douglas says that the A2D has 50 per cent better performance in terms of bomb load per mile per hour than that of the *Skyraider*.

One of the new problems created by this high speed performance is the drag of the bombs, which are mounted externally under the wings. In order for the A2D to cruise at its most efficient speed, special streamlined bombs are being developed which will permit it to fly more than 50 mph faster than with ordinary bombs installed.

The Navy has revealed how well pleased it has been with its experimental "flying test bed" by ordering the airplane directly into quantity production, proving the value of its original plan for the development of a tactical type in which to test its new engine. Grateful recipients of the new plane will be the Marine Corps pilots, who have been using their beloved Vought F4U *Corsair* for high-speed close air support. Already equipped with Grumman and McDonnell jet fighters, the A2D will round out the Marine Corps' aircraft requirements perfectly. But few should doubt that the regular Navy will see that it gets a few of the astonishing new attack planes for its own carrier air groups.

Able Mable

(*Continued from page* 21)

Bend tail skid from 1/16" piano wire and bind to a piece of 1/8" hard balsa sheet with heavy thread and cement to rear of bulkhead #5. Cut the fuselage bottom pieces using patterns on plans and cement in place.

Wing: Cement together three pieces of 3/8" x 3" sheet balsa to form wing. When thoroughly dry, carve to airfoil shape and taper to 1/4" thickness at tips using a model maker's plane. Sand smooth and cut 1/8" wide grooves to accommodate the aluminum tubing for lead wires. Install tubing and cover with 1/16" x 1/8" balsa strips. Be sure the lead wire tubes are in the exact positions indicated on the plans.

Install wing on top of fuselage using ample cement. Cement top parts of bulkheads #2 and #3 to top of wing. Drill holes in engine bearers for mounting screws and mount engine in fuselage with nuts soldered to brass plates on under side of engine bearers. Cement these plates to bearers well. It is necessary to file away a small amount on each side of engine cylinder so that it may be inserted down between engine bearers. Hollow out forward fuselage bottom to clear cylinder head and cut hole for glow plug. This hole must be large enough to admit a plug wrench. Rough-cut the cowl blocks on a jigsaw, trim to shape and cement in palce around engine, so that they fit snugly against sides of cylinder. Carve outside of cowl to shape indicated, blending blocks smoothly together.

Tail Surfaces: Cut stabilizer and elevators from hard 1/8" sheet balsa. Cement stabilizer to top rear of fuselage. Cut fin and rudder from 1/16" plywood and cement fin in place on top of stabilizer. Add 1/8" sq. balsa stringer across top of bulkheads. Cement elevators to 1/8" x 1/4" hardwood spar and attach control horn to spar in proper position with a strip of cloth as reinforcement. Now attach elevator assembly, using hinges cut from linen aircraft tape.

Cut 1/8" plywood bellcrank mount to fit through opening in wing and bolt bellcrank to this mount. Secure mount to engine bearers with flat-head wood screws, drilling holes for screws to avoid splitting bearers. Bend pushrod from 1/16" piano wire and install in fuselage. Also install fuel shut-off pushrod and adjust to trip on about 1/4" down elevator. Add lead-out cables, wrapping and soldering connections. Be sure that controls operate without any binding whatever. Now add 1/16" sheet balsa covering to upper rear of fuselage.

Carve upper cowl block from soft balsa and hollow to about 3/16" thickness. Add 3/16" sheet balsa bulkheads inside front and rear ends of this block. Cement the 1/8" hardwood alignment dowels in place and drill holes in upper cowl to match up with these dowels. Make cowl hold-down latch as indicated on plans and assemble to model. Install air exit baffles and landing gear fairings as shown. Make wire hook for bottom of rudder and cement in place with cloth reinforcement. Join rudder to fin with linen hinges.

Construct fuel tank as shown from .010" brass shim stock. Check volume after assembly by filling with water and then forcing water out of outlet line into a 1 oz. measure. Install tank in plane and cut holes in top cowl block for vent lines. Remove engine and tank from plane before proceeding further.

Sand entire model smooth. Cut down a Berkeley *Minnow* canopy to fit cockpit. Paint inside of cockpit black and install pilot. Cement canopy in place and cover with masking tape until model is completely finished. Gouge a hole on under side of right (outboard) wing and insert strips of solder until plane balances slightly heavy on that side. Cover this hole with sheet balsa and sand smooth.

Paint the entire plane, including the inside of the engine compartment and tank compartment, with DuPont *Preparakote* primer. This is a fuel-proof primer and can be obtained at automotive supply houses. Sand thoroughly and if necessary add a second coat of primer and again sand smooth. Finish entire model with DuPont *Dulux* enamel.

Install wheels on landing gear and adjust rudder off-set mechanism so that the rudder is held in the proper position by the rubber band. This set up is very important. It has been found that if no off-set rudder is used it is very difficult to make successful take-offs due to engine torque.

To decrease fuel consumption, a tubular restriction is used in the air intake of the *McCoy 29* used in the original model. This restriction has a 3/16" inside diameter and is held in place by the carburetor jet and the needle housing. This cuts down the top speed about 7 mph but increases endurance by 19 laps. The only way to determine the best combination of prop, fuel, and intake size for your particular engine is by trial and error, so do plenty of test flying before you enter a race and get to know your plane inside and out—and be sure you have a mechanic that knows it even better!

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DECEMBER 1950
MODEL AIRPLANE NEWS

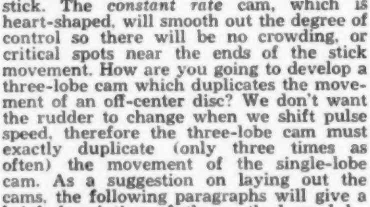
Simple Proportional Control

(*Continued from page 23*)

several years to control rudder, elevator and throttle. The fourth possible control has not been utilized so far.

Perhaps a few words on the shape of the motor-driven cams may be helpful. If round off-center discs are used, the neutral will be nice and broad but there will be a lot of control crowded up in the last few degrees of the movement of your control stick. The *constant rate* cam, which is heart-shaped, will smooth out the degree of control so there will be no crowding, or critical spots near the ends of the stick movement. How are you going to develop a three-lobe cam which duplicates the movement of an off-center disc? We don't want the rudder to change when we shift pulse speed, therefore the three-lobe cam must exactly duplicate (only three times as often) the movement of the single-lobe cam. As a suggestion on laying out the cams, the following paragraphs will give a brief description of the method used by the writer.

Bakelite or *Celeron*, (cloth impregnated with bakelite) makes the best material for



Here is the control box for two channels and two pulse rates

the cams. It should be 1/8" or more thick, depending upon how you intend to fasten it on the shaft.

A constant-rate cam is one which has a steady increase or decrease in its lift. If you wind a string around the shaft, pass an ice-pick thru a loop at the end of the string, then scribe part of a circle (keeping the string tight,) the scribed line will have a constant rate of progression, toward or away from the center, according to whether the string is winding or unwinding. If we want a 3/16" rise in half a revolution, we would select a 1/8" shaft, as the circumference of the shaft would be approximately 3/8", and half a turn would give us the 3/16" movement. To lay out the three lobes, just use a bushing around the shaft to make it three times as large; in this case the bushing should be 3/8" dia., as this will give a 3/16" rise in one-sixth of a circle. When finishing up the cams with a file be sure all peaks are exactly the same height from center. A look at the bobbin winder cam on the sewing machine will give you a good idea of how the single-lobe cam should look.

Another type of construction employed on an early pulse control, but not illustrated here, was an oscillating cam. This was made from an old electric windshield wiper motor and gear unit.

Fig. 4 shows still another possible style of pulsing control construction. One was started especially for this article, but was not completed in time to photograph. The rotor is made from pieces of bakelite rod and brass rod of the same diameter. After drilling the shaft hole in both rods, they were sawed at an angle as shown, and filed to fit together when pushed on the shaft. One electrical connection is made to the shaft, the other to the control arm.

The drawings all show worm-gear drives; although this is not essential, worm reductions are usually more compact than a gear train. Model electric train motor should be a good source of power for the pulser.

Now for the *pulse rate* control. Let's consider the ignition system of a gas engine for a moment. No matter how long or how short a time the breaker points are closed, we get a spark only at the instant the points open. The reason for this is that the magnetic flux (or lines of force) built up in the spark coil collapses very rapidly when the battery circuit is suddenly opened. As the collapsing lines of force cut across the many turns of the secondary coil, a very high voltage is generated. While there is some voltage generated by the building-up of these lines of force when the contact points close again, this voltage is nowhere near as high. Each time there is a make or a break in the primary circuit, there is a definite amount of power imparted to the secondary circuit; this is independent of the length of time between the make and break. Therefore, in our *pulse rate* unit, the voltage stored in the condenser is proportional to the number of makes and breaks per sec. As the pulse rate is increased, the voltage increases until finally the relay is pulled closed; as the rate is decreased the voltage falls, and somewhere down the line the relay has insufficient voltage to hold, and it drops open.

The *pulse rate* unit using the copper-oxide or selenium rectifier is more simple than the unit using a tube, but requires considerably more power from the *actuator* batteries. The unit using the tube gives a much greater change in current through the relay coil as well as a greater maximum current. The example pictured gives a current change of 0.1 ma. to 2 ma. on the same pulse rates that give 0.2 ma. to 0.7 ma. with the copper-oxide rectifier. A unit was tried using a pair of 1N34 crystals as a full-wave rectifier. The center tap of the transformer was used as the negative, and one 1N34 was connected from each side of the winding to the positive output. This works even more efficiently than the dry disc rectifier, but it is uncertain how long the 1N34's will stand up.

The copper-oxide rectifiers used here are rated 20 ma. and 80 V. maximum, although 10 ma., 20 V. rectifiers have been used with satisfactory results.

The condensers across the secondaries of the transformers, shown dotted, were found necessary when using spark ignition on the motor.

The *Ouncer* transformers we wanted to use are quite expensive, so the writer purchased several BC347 Inter-phone Amplifiers for the price of one *Ouncer*. (Watch those surplus ads.) There are two transformers in each amplifier.

The 0.1 mfd. condenser in the tube unit, and the 25 mfd. in the other unit may be reduced in capacity to cut the operating time until a point is reached where the relay chatters. The values given were found to be optimum.

You are sure to run into trouble if you try to run the pulse rate too high. Some fellows have the idea of running the rate up until the rudder stops flapping and just vibrates a little, but the writer has found there is so much delay in the recovery of the receiver after a signal stops that the control becomes very one-sided — the "Right" control becomes "all or nothing." It is quite possible to adjust the loading on the receiver when using an RK61 receiver, to take 10 pulses per sec., and still keep a fairly even "Left" and "Right."

Just a word about operation on two R.F. channels. The RK61 receivers have been used here for years with two receivers operating in the 6-meter band; at the Nationals last summer the receivers were turned on while Jim Walkers R.C. Lawn Mower was also working on 2 channels in the same band, and there was no interference at only 50'. That seems to prove that as many as four good clean signals can operate in the same band simultaneously. (The writer uses only crystal-controlled transmitters).

However, may I give a few sad words of advice about multi-channel operation? Using rudder, elevator, and throttle controls, with the first two in great enough quantities to really cut-up, is strictly for the "hot pilots." The mortality rate here is not to be taken lightly, as was well borne out by the writer's fatal first flight at the

1950 NATs. And as "Siggie" Siegfried was heard to say several years ago, as he viewed the mangled remains after a swift power dive, "I should'a give it up." Sometimes those famous last words come back to me, but I'm still not quite sure what he meant he "should'a give up."

On the brighter side, though, two channels can give you two proportional and simultaneous controls, and two pulse-rate controls; some day the writer may tell you about a fifth control that can be had out of this combination for less than an ounce of additional weight in the plane! Now someone probably will figure out how to do all this on only one channel—please let the rest of us in on it, won't you?

Flash

(*Continued from page 7*)

engine costs $165.00, or *four times* as much! Now can you see why the turboprop shows so much promise?

TWO NEW helicopters have joined the Army with the purchase of the Kaman YH-22 and the Hiller YH-23. These are simply standard versions of these well-known helicopters obtained by the Army for tests and evaluation. It is not generally known that most of the military helicopters are going to the Army Ground Forces and to the United States Fleet, rather than the flying branches of our armed forces. The helicopter has had its first test in actual combat in Korea and there is no member of the military who does not have the highest possible praise for their value as rescue aircraft, wounded pilots being picked up right where they crashed behind the lines and being flown directly to the hospital back at the main base. With no CAA to issue restrictions, the Sikorsky craft in Korea are delivering high-ranking officers directly to the *part* of town (such as the headquarters office, the officers club, the waterfront docks, etc.) desired by the passenger and not out at the airport miles away!

REARWARD-FACING seats now appear inevitable in military aircraft. Technicians have long admitted that facing the passenger to the rear greatly lessens the dangers in a crash but the commercial airlines have long fought such an idea and will probably continue to oppose it—for obvious reasons. (Frankly we can think of nothing worse than riding backwards in an airplane.) But the Air Force, which doesn't have to worry too much about "passenger reaction" to aircraft comfort, has already ordered 600 new backward-facing seats from Beech Aircraft Corp. to be installed in its transports as new ones come off the line. The new seats are stressed to take 16 g's and that means that they can't be installed in current transports, like the C-54, because floor fittings of these types are not capable of taking such loads; the floor, seat and all would be thrown forward in a crash! But GI's are going to be watching where they've been in the future, for better or worse!

IN-FLIGHT refueling has now passed its tests with single-seat jet fighters and this rounds out the first round of its operational tests with flying colors. Air Force already has flying tankers and receivers in squadron service and the recent successful trans-Atlantic flight of Col. Dave Schilling in a Republic F-84 *Taunderjet* proves that the size or type of airplane involved is no barrier to the use of mid-air refueling. Since the flight took 10 hours, it is now clear that under favorable conditions a high-speed jet fighter can now stay on station over the front lines for that length of time, instead of the 15 minutes of which the Lockheed F-80 was capable in the opening days of the war in Korea. This effectively solves the toughest single problem of the jet fighter and makes it the all-around useful weapon that the piston-engine fighter has been for so long, plus about double its speed and rate-of-climb. More and more we are convinced that engineers can overcome any aeronautical problem—given sufficient time.

WHICH BRINGS us to the similar—but tougher—problem of the extremely short duration of the rocket-powered guided missile, which has a fuel burning time of only two or three minutes. At least one noted engineer, Dr. J. Kaplan of the University of California at Los Angeles, believes there may be a way of solving this problem, too. He says that the atmosphere from 26 to 70 miles up contains hydroxyl molecules, which is an important constituent of rocket fuel. He believes that this chemical can be taken into the rocket through a conventional air inlet and, when properly mixed, form a fuel for the rocket permitting it to stay aloft for hours at a time. Scientists have long believed that the air above about 10 miles was too rarefied to permit its use to burn fuel and thus such air-breathing missile engines as the ramjet and turbojet are useless above this altitude. The rocket, of course, carries its own fuel and oxidizer, but this tremendous fuel load has restricted rockets to the 15-ton weight of the V-2. Now it appears that rockets may take their fuel out of the atmosphere and, therefore, be able to fly around at extremely high altitudes as long as does the conventional-powered aircraft nearer the earth.

BIGGEST MODEL airplane we've ever heard of is a *one-half scale* Piper Cub recently completed by James N. Pappas of Indianapolis, Ind. The non-flying model has a span of 17' 9" and weighs 40 lb. It took Pappas eight months to build the model and William T. Piper has pronounced it a perfect duplicate of the real thing. With a real engine, the model could probably take off with a live passenger since many midget racers have wingspans much smaller than this—but we wouldn't try it!

HIT OF THE recent Society of British Aircraft Constructors show was the pair of sonic-speed fighters shown for the first time, the Hawker P.1081 and the Vickers-Supermarine 535, both swept-wing and swept-tail designs. Their low passes over the field were made at very nearly sonic speed, indicating that the U.S. has no monopoly on this speed region. One of the most astonishing aircraft in the world is

(*Turn to page 63*)

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IT LOOKS like our old friend "Rosie the Riveter" may be on her way out in the aircraft factories, at least insofar as new supersonic fighter plane construction is concerned. Lockheed and the Wyman-Gordon company are collaborating on a new method of forming whole wing sections with built-in spars and stiffeners, eliminating hundreds of thousands of rivets in wing construction. Northrop Aircraft, Inc. has also received an Air Force contract for the casting of whole wings in magnesium alloy, also eliminating riveting. The idea behind this research program, however, is *not* elimination of riveting. The real problem that the Air Force is trying to solve is how to make very, very thin wings and make them strong. When wing thicknesses get down below 10 percent (thickness divided by wing chord) there simply isn't enough room inside the wing to put in spars, stiffeners, ribs, intercostals, etc. Not only must future wings be exceptionally thin but they must be much stronger than conventional wings to take the high loads imposed by maneuvers at supersonic speed. The result will be virtually solid wings with integrally-formed ribs, stiffeners, etc., right in the metal, which will vary in thickness progressively from root to tip.

WITH ALL the modifications of big airliners for air coach passenger service, it's beginning to look like a transport plane will carry a really huge number of people (81 in the Lockheed *Connie*, 100 in the Boeing *Stratocruiser*). But don't get the idea such air coach planes will rival the familiar railroad coaches for "packing 'em in." It just so happens that the average coach train carries 650 passengers and even Pullman trains carry as high as 300 passengers. On the trans-Atlantic route, the "queens" disgorge more than 1500 people after a single crossing! So it will be many years before an airliner can seriously rival its surface companions for capacity. (The huge Convair C-99 can carry 400 troops in row-upon-row of "bucket" seats, but we don't think that even at very low fares, passengers will ever accept such discomfort!)

ONE OF THE oldest and proudest names in aviation will soon disappear. Curtiss-Wright has announced that it is definitely quitting the airplane (but not engines and propellers) business next spring due to lack of business. This will be one of the great tragedies of the aviation industry if it is allowed to occur. Linking the names of the two pioneers of world aviation, the Curtiss-Wright Airplane Division has produced a long, continuous line of exceptional aircraft including famed Air Force, Navy and commercial types far too long to list here. But the new Curtiss management is made up largely of non-aviation people whose primary interest is making money, for which you can't blame them. The Airplane Division has fallen into default because the management would not provide the funds for the necessary research and development on new types. The last Curtiss design was the XF-87 two-seat all-weather fighter, which lost out to the Northrop F-89 in the Air Force competition. North American will probably take over the Columbus, Ohio, plant of the Airplane Division and henceforth there will only be Wright engines and Curtiss propellers in the air, two fine products, but the nation will always miss Curtiss airplanes in the skies.

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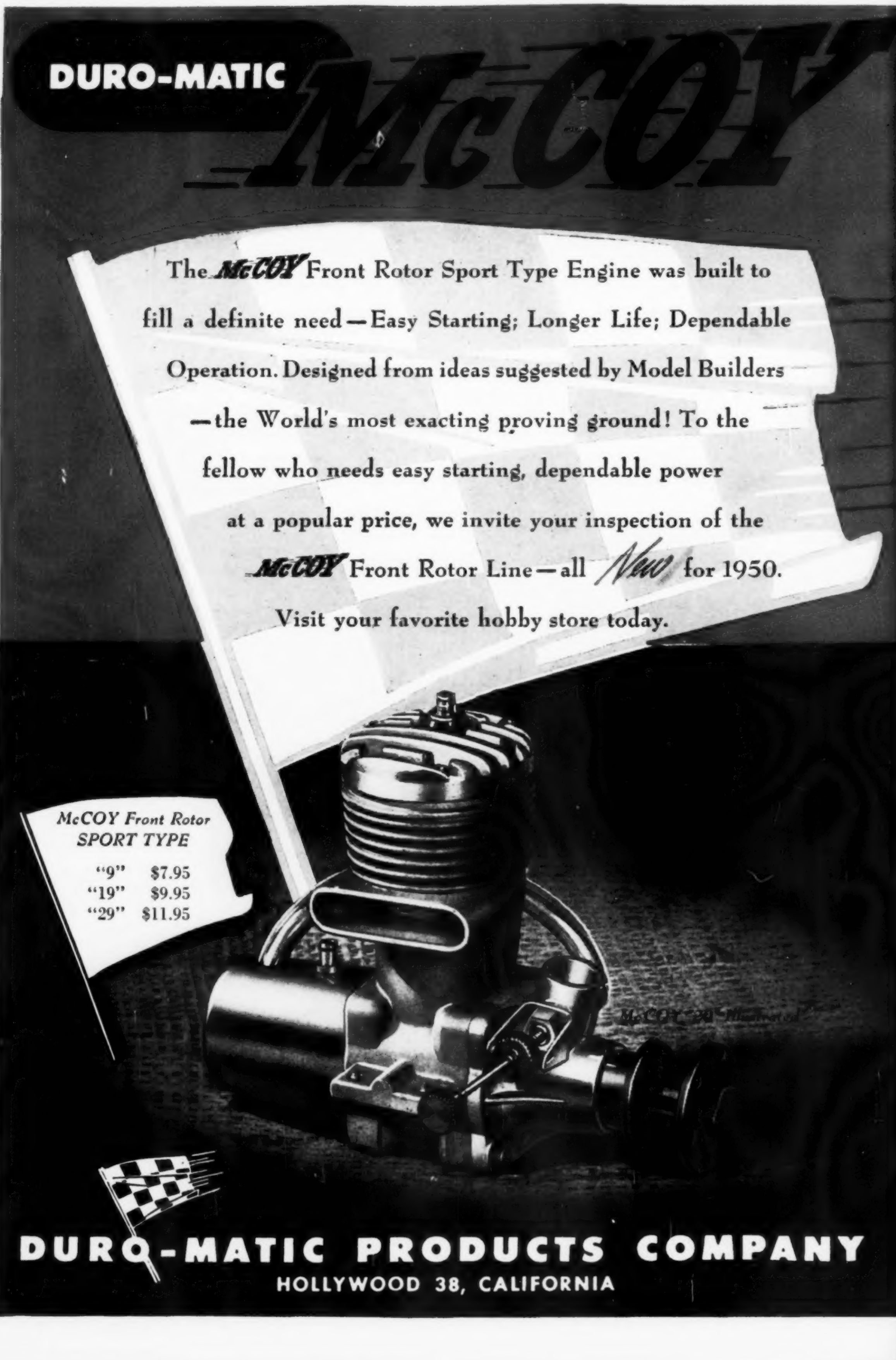
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